Appendix T:
Air Quality Resource Management Plan: Adaptive Management Strategy for Oil and Gas Resources

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Acronyms

APD	Application for Permits to Drill
AQRV	Air quality related value
AQTW	Air Quality Technical Workgroup
ARMP	Air Resource Management Plan
ARTSD	Air Resource Technical Support Document
BACT	Best available control technology
BiFO	Billings Field Office
BLM	Bureau of Land Management
CAMx	Comprehensive Air Quality Model with Extensions
CBNG	Coal bed natural gas
CFR	Code of Federal Regulations
CO	Carbon monoxide
EPA	U.S. Environmental Protection Agency
FS	U.S. Forest Service
FLPMA	Federal Land Policy and Management Act
FLIR	Forward looking infrared
FWS	U.S. Fish and Wildlife Service
hp	Horsepower
IWG	Interagency Working Group
IR	Indian Reservation
MAAQS	Montana Ambient Air Quality Standards
MAQP	Montana Air Quality Permits
$\mu g/m^3$	Micrograms per cubic meter
MDEQ	Montana Department of Environmental Quality
MOU	Memorandum of Understanding
NAA	Nonattainment area
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NO	Nitric oxide
NO_2	Nitrogen dioxide
NO_x	Nitrogen oxides
NPS	National Park Service
NSR	New Source Review
O_3	Ozone
Pb	Lead
PGM	Photochemical grid modeling
PM_{10}	Particulate matter with a diameter less than or equal to 10 microns
$PM_{2.5}$	Particulate matter with a diameter less than or equal to 2.5 microns
POD	Plan of Development
ppb	Parts per billion
ppm	Parts per million
PSD	Prevention of Significant Deterioration
REC	Reduced emissions completion
ROD	Record of Decision
RMP	Resource Management Plan
SEIS	Supplemental Environmental Impact Statement
SLAMS	State or Local Air Monitoring Station
SO_2	Sulfur dioxide
tpy	Tons per year
USDI	U.S. Department of the Interior
VOC	Volatile organic compound
WRAP	Western Regional Air Partnership
WRF	Weather and Research Forecasting

1.0 INTRODUCTION

1.1 Purpose of the Air Resource Management Plan

The Bureau of Land Management (BLM) Billings Field Office (BiFO) Air Resource Management Plan (ARMP) for oil and gas activities describes the air quality adaptive management strategy that would be used to assess future air quality and Air Quality Related Values (AQRVs) and identify mitigation measures to address unacceptable impacts that may could potentially be associated with future oil and gas development. The adaptive management strategy focuses on oil and gas activity because aggregated emissions from multiple small sources at well sites can potentially cause significant air quality and AQRV impacts under certain circumstances.

The BLM works collaboratively with the Montana Department of Environmental Quality (MDEQ) to promote air quality monitoring near oil and gas activity areas and will work closely with the MDEQ on any future emission mitigation considered under this ARMP. Many of these small oil and gas emission sources are not required to obtain air quality permits from the Montana Department of Environmental Quality (MDEQ), unlike large stationary sources such as coal mines that are permitted and inspected by the MDEQ. The oil and gas adaptive management strategy was prepared by the BLM in collaboration with or with input from the U.S. Environmental Protection Agency (EPA) and three federal land management agencies under the Memorandum of Understanding Among the U.S. Department of Agriculture [USDA], U.S. Department of the Interior [DOI], and U.S. Environmental Protection Agency, Regarding Air Quality Analyses and Mitigation for Federal Oil and Gas Decisions Through the National Environmental Policy Act [NEPA] Process (DOIUSDA 2011). This Memorandum of Agreement (MOU) is described in more detail in Section 1.4 of this appendix. Although not a signatory to the MOU, the MDEQ participates in the Air Quality Technical Workgroup (AQTW) that was established to implement the MOU process for the Proposed Resource Management Plan (PRMP) and Environmental Impact Statement (EIS).

This agreement is described in more detail in Section 1.4.

As described in Chapter 3 of the PRMP/EIS, the MDEQ and EPA implement the Clean Air Act within non-tribal portions of the planning area, while EPA implements the Act in tribal areas. State and federal emission control regulations and air quality permitting programs apply to many oil and gas sources. However, some of the smallest oil and gas emission sources are not required to obtain air quality permits. Facilities that have the potential to emit less than 25 tons per year of a regulated air pollutant are generally not required to obtain state or federal air quality permits or register their facilities with MDEQ. At these smallest facilities, certain activities and equipment are subject to state and federal emission control regulations. The ARMP provides a means for the BLM to satisfy its statutory responsibility under NEPA and FLPMA to protect air quality and other natural resources. Under the ARMP, the BLM will take appropriate management action if monitoring data for local areas with BLM-authorized oil and gas activity indicate that additional emission reductions may be needed to maintain good air quality. Due to the fragmentation of surface and mineral estate within the planning area, the BLM and MDEQ would seek a consistent emission control approach throughout an area of concern.

The ARMP includes both near-term actions and long-term actions. In the near-term, the ARMP sets forth initial actions to maintain good air quality until regional modeling can be performed to further assess potential impacts to air quality and AQRVs. In the long-term, the ARMP provides ongoing management strategies to assess and adapt to new air quality and AQRV ambient monitoring and modeling data during the life of this Resource Management Plan (RMP).

The ARMP includes a multifaceted approach involving the following activities.

- Oil and gas activity assessment
- Ambient air quality monitoring support
- Air quality and AQRV assessment
- Future air quality and AQRV modeling
- Mitigation

Pollutant emissions addressed by the ARMP include the criteria air pollutants listed below.

- Carbon monoxide (CO)
- Nitrogen dioxide (NO_2)
- Ozone (O_3)
- Particulate matter with a diameter less than or equal to 10 microns (PM_{10})
- Particulate matter with a diameter less than or equal to 2.5 microns ($PM_{2.5}$)
- Sulfur dioxide (SO_2)

Lead emissions are not included because high concentrations of this pollutant are unlikely to occur from oil and gas development within the planning area.

The ARMP also addresses modeling and mitigation for the following AQRV assessments.

- Deposition of sulfur and nitrogen
- Lake acid neutralizing capacity
- Visibility

The adaptive management strategy for oil and gas resources provides the flexibility to respond to changing conditions that could not have been predicted during RMP development. The strategy also allows for the use of new technology and methods that may minimize or reduce impacts.

1.2 Revision of the Air Resource Management Plan

This ARMP may be modified as necessary to comply with law, regulation, and policy and to address new information and changing circumstances. Changes to the goals or objectives set forth in the BiFO RMP/EIS would require maintenance or amendment of the RMP while changes to implementation, including modifying this ARMP, may be made without amending the RMP.

1.3 Current Air Quality

Based on available monitoring data in the BiFO, air quality is generally good, except for industrial areas influenced by emissions from some refineries. See Chapter 3 for a description of air quality within the BiFO. Federal air quality standards for criteria air pollutants are known as National Ambient Air Quality Standards (NAAQS), while state-based standards are known as the Montana Ambient Air Quality Standards (MAAQS).

1.4 Background of the AQTW and the MOU Regarding Air Quality Analyses and Mitigation for Federal Oil and Gas Decisions Through the NEPA Process

The Air Quality Technical Workgroup (AQTW) is required to include representatives from the following agencies: the BLM, EPA, U.S. Forest Service (FS), U.S. Fish and Wildlife Service (FWS), and the

National Park Service (NPS). Each of these agencies is a party to the *Memorandum of Understanding Among the U.S. Department of Agriculture, U.S. Department of the Interior, and U.S. Environmental Protection Agency, Regarding Air Quality Analyses and Mitigation for Federal Oil and Gas Decisions Through the National Environmental Policy Act Process* (USDA 2011) (herein referred to as the MOU). This agreement is designed to ". . . facilitate the completion of NEPA environmental analyses for Federal land use planning and oil and gas development decisions [USDA 2011]." Additional entities may also participate in the AQTW, such as the MDEQ and tribal entities.

The BLM asked the MDEQ to join the AQTW. The MDEQ has primary authority to protect air quality within the state. Although the MDEQ is not a signatory to the national MOU, successful air quality management of BLM-authorized oil and gas activities depends on a close working relationship between the BLM and the MDEQ. The two agencies have worked together to improve air quality monitoring and will continue to cooperate by sharing data, planning modeling efforts, and working together to identify emission reduction measures needed to maintain good air quality in areas with oil and gas activity.

The MOU sets forth collaborative procedures that the AQTW agencies use to analyze potential air quality and AQRV impacts. The agencies also work together to identify potential mitigation measures that may be needed to reduce impacts to air quality and AQRVs. The lead agency (the BLM in this case), in collaboration with the other agencies, has the responsibility to identify reasonable mitigation and control measures to address adverse impacts to air quality. Mitigation measures may also address impacts to AQRVs at Class I areas and at sensitive Class II areas that have been identified by the BLM, FS, FWS, and NPS.

The AQTW provided input to this ARMP and will continue to work collaboratively on future modeling efforts associated with this RMP. Provisions of the MOU continue to apply to future oil and gas activities in the planning area. In some cases, air quality and AQRV modeling performed under this ARMP may be sufficient to address modeling needs for future oil and gas projects that would otherwise require additional modeling under the MOU. However, the ARMP in no way replaces provisions of the MOU. Determinations of existing modeling adequacy for future oil and gas activities that trigger the MOU would be made collaboratively by the AQTW using the procedures included in the MOU.

1.5 MDEQ Air Quality Management and BLM Mitigation Measures

Primary air quality management authority and responsibility for the planning area rest with the MDEQ (for non-tribal areas of the planning area) and the EPA for tribal areas. However, the BLM also plays a role in protecting air resources under the Federal Land Policy and Management Act (FLPMA) and NEPA. Due to the nature of NEPA analyses for land use planning, the BLM's air resource management role is forward-looking because air resource impacts are analyzed for future activities that may or may not occur.

1.5.1 MDEQ Air Quality Programs

The MDEQ has been delegated Federal Clean Air Act authority from EPA to regulate air quality and air emissions requirements within the non-tribal areas of Montana. The MDEQ also implements state ambient air quality standards for additional air pollutants and has established more stringent standards for some criteria air pollutants, as shown in Table 1. As part of NAAQS implementation, the MDEQ operates air quality monitors through Montana.

The MDEQ has State Implementation Plan approved New Source Review (NSR) permitting programs, which include Prevention of Significant Deterioration (PSD), Nonattainment Area (NAA), and minor source programs. The MDEQ's PSD and NAA permitting programs impose controls on major stationary sources in order to control emissions of regulated pollutants. Emission controls are typically required

through the application of Best Available Control Technology (BACT) or Lowest Achievable Emission Rate, depending on the applicable NSR permitting program. In addition, the MDEQ implements a minor source NSR permitting program (e.g., minor source Montana Air Quality Permits [MAQP] and registrations). The MDEQ's minor source NSR program requires sources with a potential to emit greater than 25 tons per year (tpy) of any regulated air pollutant to apply for a permit to construct pursuant to the MAQP requirements or register with the MDEQ pursuant to the registration requirements under the Administrative Rules of Montana (ARM). To ensure compliance with the NAAQS, MDEQ's minor NSR program contains regulatory requirements that track activity and require the application of BACT. Additionally, the ARM require reasonable precautions to limit fugitive particulate emissions from all activities in Montana (i.e., permitted, registered, and those facilities that do not require a permit/registration). MDEQ's NSR program not only provides the emission benefits necessary to attain Montana's air quality goals, but also includes many features that provide regulatory certainty while still allowing flexibility in the implementation of Montana's air quality programs.

1.5.2 MDEQ Oil and Gas Emission Control Requirements

The MDEQ minor source permitting and registration program for oil and gas facilities includes a robust set of emission controls. MDEQ rules require oil or gas well facilities to control emissions from the time the well is completed until the source is registered or permitted. Facilities that choose to register must meet the emission control requirements contained in Administrative Rules of Montana (ARM) 17.8.17. If a source cannot meet these requirements it must apply for an MAQP. The MAQP requires a case-by-case BACT analysis. A case-by-case BACT analysis may include design, equipment, work practice, or operational standards in place of or in combination with an emission limitation.

Examples of MDEQ emission control requirements for oil and gas facilities (defined as those with a potential to emit more than 25 tpy of any airborne pollutant) include the following measures to limit emissions.

- Each piece of oil or gas well facility equipment containing volatile organic compound (VOC) vapors (as defined in the permitting or registration regulations) with a potential to emit 15 tpy or more must be routed to a gas pipeline or to air pollution control equipment with 95 percent or greater control efficiency (registered facilities). This requirement applies to the following equipment.
  - Oil and gas wellhead production equipment including, but not limited to, wellhead assemblies, amine units, prime mover engines, phase separators, heater treatment units, dehydrator units, storage tanks, and connector tubing
  - Transport vehicle loading operations
- Hydrocarbon liquids must be loaded into transport vehicles using submerged fill technology.
- Stationary internal combustion engines greater than 85 brake horsepower must be equipped with nonselective catalytic reduction (for rich burn engines) or oxidation catalytic reduction (for lean burn engines) or equivalent emission reduction technologies.
- Piping components containing VOCs must be inspected for leaks each month. The first attempt to repair any leaking VOC equipment must occur within 5 days and the repair must be completed no later than 15 days after the leak is initially detected unless facility shutdown is required. Facilities are required to maintain monthly leak inspection and repair records.

Although MDEQ emission control requirements do not mention greenhouse gas (GHG) emissions, the VOC emission control measures would also reduce methane emissions, while the engine emission controls would reduce nitrous oxide emissions.

The MDEQ oil and gas emission control requirements have successfully protected air quality throughout the planning area, as evidenced by ambient air quality monitoring data that indicate good air quality in oil and gas activity areas.

1.5.3 BLM Air Resource Management and MDEQ Coordination

The BLM's authority to address air resources derives primarily from FLPMA and NEPA. Under FLPMA, the BLM must "provide for compliance with applicable pollution control laws, including State and Federal air, water, noise, or other pollution standards or implementation plans" in the development and revision of land use plans (Section 202 (c)(8)). FLPMA also authorizes the BLM to manage public lands "in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resource, and archeological values" (Section 102 (8)).

Under NEPA, the BLM ensures that information on the potential environmental and human impact of Federal actions is available to public officials and citizens before decisions are made and before actions are taken. One of the purposes of the Act is to "promote efforts which will prevent or eliminate damage to the environment and biosphere," and to promote human health and welfare (Section 2). NEPA requires that BLM and other federal agencies prepare a detailed statement on the environmental impact of the proposed action for major Federal actions expected to significantly affect the quality of the human environment (Section 102 (C)).

The BLM's authority under the Clean Air Act primarily derives from the requirement that BLM-authorized activities comply with the Clean Air Act. BLM-authorized activities may not violate the Clean Air Act or federal and state regulations and State Implementation Plans issued to implement the Act. When air quality or AQRV modeling performed during NEPA analysis predicts potential violations of the Clean Air Act or unacceptable AQRV impacts, the BLM evaluates the data and determines whether mitigation measures are needed. For example, the initial mitigation measure requiring drill rig engines to meet Tier 4 emission standards reduces NO_2 emissions and was demonstrated via modeling to prevent NAAQS violations from multiple large drill rig engines that may operate on one well pad. The mitigation measure includes an exception that allows use of drill rig engines meeting Tier 1, 2, or 3 emission standards if future modeling or near-field monitoring demonstrates compliance with the NAAQS.

When determining whether mitigation measures are needed, the BLM reviews current and proposed federal, state, and local regulations to determine whether mitigation will occur due to other agency actions. If the BLM determines that additional mitigation is needed while implementing this ARMP, the BLM will work closely with the MDEQ to coordinate future mitigation measures for BLM-authorized activities.

1.6 Relationship to the Montana SEIS ROD ARMP

This ARMP integrates and supplements earlier ARMP provisions within the *Record of Decision (ROD) for the Supplement to the Montana Statewide Oil and Gas Environmental Impact Statement and Amendment of the Powder River and Billings Resource Management Plans* (BLM 2008b). Provisions of the Montana Statewide Supplemental Environmental Impact Statement (SEIS) ARMP are currently in effect and were developed to address substantial predicted growth in coal bed natural gas (CBNG) drilling and production in the Powder River Basin. Based on extensive air quality and AQRV far-field modeling, predicted impacts described in the Supplemental Air Quality Analysis (BLM 2007, BLM 2008a) were associated primarily with projected emission increases from the operation of additional compressor engines. Consequently, increases in total compression horsepower were determined to be an indicator of oil and gas activity growth that could potentially degrade air quality and AQRVs.

ARMP provisions included in the SEIS ROD are summarized below.

- Emission Mitigation
    - Fugitive dust controls are required to reduce PM_{10} and $PM_{2.5}$ emissions from unpaved roads.
    - The number of wells connected to each compressor must be maximized and natural-gas-fired or electrical compressors or generators are required.
    - Operators within 5 miles of the Northern Cheyenne Indian Reservation (IR) and the Crow IR may be required to restrict the timing or location of CBNG development if monitoring or modeling by the MDEQ finds their CBNG development is causing or threatening to cause noncompliance with applicable local, state, tribal, and federal air quality laws, regulations, and standards, as well as state implementation plans developed by the MDEQ.
- Activity and Emission Monitoring
    - Compression horsepower associated with CBNG is required to be reviewed.
    - Annual emission inventory reports for CBNG operations are required to be submitted by operators.
- Ambient Air Quality Monitoring
    - The BLM will develop monitoring plans to track regional cumulative impacts to air quality and establish programmatic mitigation at predetermined action levels.
    - Ambient concentration data from the Billings St. Luke's monitoring site (and potential future sites) will be used to meet ambient monitoring requirements included in Table MON-1 of the SEIS ROD.
- Air Quality Impact Review
    - Oil and gas operators are required to provide information necessary for the BLM to conduct an analysis of air quality impacts when submitting exploration Applications for Permits to Drill (APDs) or field development project plans for CBNG development. BLM uses the information to determine the individual and cumulative impact on tribal air quality; disclose the analysis results in the appropriate NEPA document; and consult with the Tribe when the analysis shows impacts from a specific drilling or development proposal.
    - An Interagency Working Group (IWG) was formed consisting of the BLM, EPA, NPS, and FS and other federal agencies, state agencies, and tribal authorities to address CBNG development in the Montana portion of the Powder River Basin and its impacts to air quality. In addition to other resource responsibilities, the IWG is responsible for developing and recommending the monitoring and mitigation measures needed for each agency to ensure its actions achieve compliance with applicable air quality standards across jurisdictional boundaries.

- Air Quality and Visibility Modeling
    - The MDEQ agreed to complete an annual cumulative air quality impact model to track air quality impacts of CBNG development, including relevant CBNG development in Wyoming.
    - The BLM and the MDEQ will perform additional visibility modeling to assess visibility impacts when horsepower (hp) requirements for new CBNG wells in the Montana portion of the Powder River Basin exceed 133,956 hp.

The above requirements are being integrated into this ARMP. Some provisions are being updated to reflect the current state of knowledge, while other provisions are being expanded to provide for a more comprehensive adaptive management strategy. Modeling provisions within the SEIS ARMP are being revised to reflect an improved modeling approach (described in Section 5.0) that would provide a more comprehensive assessment of visibility and criteria pollutants, including ozone. CBNG development in the Montana portion of the Powder River Basin did not materialize as predicted at the time of the SEIS. According to the MDEQ, CBNG compression within the Montana portion of the Powder River Basin has decreased by 1,676 hp since January 1, 2010 (MDEQ 2011). Due to the lack of CBNG development and with no new compression equipment emissions to model, the MDEQ determined that additional ambient air quality monitoring would be the best air quality indicator. With funding provided by the BLM, two new monitoring stations were installed in the Powder River Basin east of the planning area near Birney (Rosebud County) and Broadus (Powder River County) in 2009.

The remainder of this ARMP describes each of the provisions being carried forward from the SEIS ARMP.

2.0 OIL AND GAS ACTIVITY ASSESSMENT

Each year, the BLM would track the number and locations of new oil and gas wells drilled on federal mineral estate and the number of new and abandoned producing wells on federal mineral estate. These numbers would be compared to the planning area Reasonably Foreseeable Development (RFD) and to the level of oil and gas development identified in the proposed alternative.

In addition, the BLM would estimate oil and gas emissions from federal mineral estate every three years for oil and gas wells drilled and producing after the ROD is signed. Emission estimates would be based on well types, well numbers, and knowledge of typical equipment and operations. Emission estimation methods are expected to improve over time as better data become available. The emission estimates would also account for implemented mitigation measures and for new emission control regulations as they become effective. Each three-year oil and gas emission inventory would be compared to emission estimates for the RFD and the proposed alternative. The BLM would collect additional data related to oil and gas equipment and operations to improve emission inventory quality. One area identified for improvement involves acquiring better data on oil and gas equipment used in the planning area. In order to improve fugitive dust emission estimates, the number, type, and length of vehicle trips in high-activity areas would also be assessed.

For the portion of the Powder River Basin located in the BIFO, increases in compressor horsepower would be tracked annually using data provided by the MDEQ.

Each three-year oil and gas emission inventory would be compared to emission estimates for the RFD and the proposed alternative.

3.0 AMBIENT AIR QUALITY MONITORING SUPPORT

The MDEQ Air Resources Management Bureau has primary responsibility for siting and operating ambient air quality monitors within Montana and for reporting monitoring data to the EPA and to the public. As described in its annual Air Quality Monitoring Network Plan (MDEQ 2012), the MDEQ identifies monitoring objectives for assessing ambient concentrations of criteria air pollutants and assessing compliance with the NAAQS and MAAQS.

MDEQ-operated monitors in the planning area are limited to two monitors located in Billings. Of these, $PM_{2.5}$ concentration data from the Billings St. Luke's monitor (20-111-0085) would be considered to be representative of air quality in the planning area. The Billings Coburn Road monitor (30-111-0066) measures SO_2 concentrations near two refineries within 3 kilometers of the monitoring site. Due to the close proximity of the refineries, SO_2 concentrations from the Coburn Road site are not representative of SO_2 concentrations in rural oil and gas activity areas and data from this monitor would not be reviewed under this plan.

Due to the area's low concentrations of NO_2, ozone, and PM_{10}, these pollutants are not currently monitored in the planning area. If, in future years, additional MDEQ-operated monitoring stations are installed and operated for the purpose of assessing air quality impacts from oil and gas activity, ambient monitoring data from these monitors would be used for ambient air quality assessments under this plan.

4.0 AIR QUALITY AND AQRV ASSESSMENT

The BLM would assess air quality and AQRVs on an annual basis using quality-assured data from the EPA, MDEQ, FS, FWS, NPS, and other sources. In addition, if ozone monitoring data become available for the planning area, a preliminary assessment of ozone concentrations would be performed on a weekly basis using data provided by the MDEQ.

4.1 Annual NAAQS and MAAQS Assessment

Based on the representative monitor(s) listed in Section 3.0, the BLM would assess air quality monitoring data annually and would share the results of the assessment with the MDEQ and AQTW. The purposes of the annual assessment are to compare monitored data to NAAQS and MAAQS and to identify seasonal and long-term trends in air pollutant concentrations. The BLM would complete the annual assessment by May 31 of each year in order to ensure that quality-assured data are available for review. Monitoring data associated with exceptional events, typically due to wildfires, would be excluded from the assessment.

NAAQS and MAAQS are provided in Table 1. Montana standards are shown only if they are more stringent than the NAAQS.

Although most of the pollutants are not currently monitored in the planning area, the standards are provided to illustrate the framework for assessing monitoring data that may become available in the future. The standards shown in Table 1 would be revised to reflect future regulatory changes.

The BLM would use design values to compare ambient monitoring data to the NAAQS. Design values reflect the form of the NAAQS; they define the statistical metric used to compare monitoring data to federal standards. Depending on the pollutant and averaging time being assessed, a NAAQS is typically stated in terms of the maximum or second maximum concentration, average concentration, or a percentile of the standard. The form of a standard also states whether the design value is determined based on one or more years of monitoring data. EPA-calculated design values serve a critically important regulatory purpose; they determine whether areas are designated attainment or nonattainment. As such, EPA's design value determinations may take more than one year to finalize.

In order to review air quality trends more quickly, the BLM would determine "mitigation design values" by May 31 of each year for the previous calendar year(s). The mitigation design value would be a metric calculated by the MDEQ or BLM that uses procedures similar to EPA's regulatory design value calculation methodology, with the advantage that the MDEQ/BLM-calculated mitigation design values can be determined more quickly. The timing allows the MDEQ adequate time to quality assure monitoring data. However, the MDEQ may not yet have EPA concurrence on data that have been flagged by the MDEQ due to exceptional events, such as wildfires. Consequently, the MDEQ/BLM-calculated mitigation design values would exclude monitoring data associated with MDEQ-identified exceptional events. Each BLM annual assessment would look back the requisite number of years for each pollutant and include data from the time period prior to ROD issuance for the first several annual BLM assessments. Additional information concerning design value calculations is provided in Section 6.2.3. The BLM will work closely with the MDEQ to ensure that only data certified by the MDEQ and procedures consistent with MDEQ procedures are used in design value calculations.

Table 1. Ambient Air Quality Standards

Pollutant	Averaging Period	Federal NAAQS [1]			MAAQS [2]
		Concentration	Standard Type	Form of NAAQS Primary Standard	Concentration
CO	1-hour	35 ppm	Primary	Second maximum	23 ppm[5]
	8-hour	9 ppm	Primary	Second maximum	---
NO_2	1-hour	100 ppb	Primary	3-year average of the 98th percentile concentrations	0.30 ppm
	Annual	53 ppb	Primary, Secondary	Annual mean	0.05 ppm [7]
Ozone	1-hour	---	---	---	0.12 ppm [7]
	8-hour	0.075 ppm	Primary, Secondary	3-year average of the fourth highest daily maximum 8-hour average	---
$PM_{2.5}$	24-hour	35 µg/m^3	Primary, Secondary [3]	3-year average of the 98th percentile concentration	---
	Annual	12.0 µg/m^3	Primary	3-year average of the annual mean	---
	Annual	15.0 µg/m^3 [3]	Secondary	3-year average of the annual mean	---
PM_{10}	24-hour	150 µg/m^3	Primary, Secondary	NTBE more than one per year on average over 3 years	---
	Annual	Revoked [4]	---	---	50 µg/m^3 [5]
SO_2	1-hour	75 ppb	Primary	3-year average of the 99th percentile concentrations	0.50 ppm
	3-hour	0.5 ppm	Secondary	---	---
	24-hour	---	Primary	---	0.10 ppm[5]
	Annual	---	Primary	---	0.02 ppm[6]

CO carbon monoxide
µg/m^3 micrograms per cubic meter
MAAQS Montana Ambient Air Quality Standards
NAAQS National Ambient Air Quality Standards
NO_2 nitrogen dioxide
NTBE Not to be exceeded
$PM_{2.5}$ particulate matter less than or equal to 2.5 microns
PM_{10} particulate matter less than or equal to 10 microns
ppb parts per billion
ppm parts per million
SO_2 sulfur dioxide

[1] NAAQS are codified in Title 40 of the Code of Federal Regulations (CFR), Part 50.
[2] Montana AAQS are codified in Title 17, Chapter 8, Subchapter 2 of the Ambient Air Quality in the Administrative Rules of Montana.
[3] EPA proposed a new secondary standard for $PM_{2.5}$ visibility of 28 or 30 deciviews (equivalent to 24 or 19 kilometers [15 or 12 miles] standard visual range).
[5] The annual PM_{10} NAAQS was revoked October 17, 2006.
[6] Based on annual second maximum.
[7] Not to be exceeded in the averaging period specified.
[8] State violation when exceeded more than once during any 12 consecutive months.

4.2 Preliminary Ozone Assessment

If an MDEQ-operated ozone monitor is installed and operated in the planning area, the BLM would perform weekly preliminary ozone concentration reviews to determine if high ozone events occur. If a high-ozone event occurs, the BLM would document meteorological and other conditions that may have contributed to the event. Because high-ozone events in other rural parts of the nation are not well understood and contributing factors can be site-specific, the BLM would gather data to develop baseline

information relevant to any high-ozone events that may occur within the planning area. Relevant baseline information includes capturing meteorological data for each event, determining the amount of snow on the ground (if applicable), and identifying any other data that may help describe circumstances associated with the event. For the purposes of this effort, high-ozone events would be defined to be days for which the maximum 8-hour average ozone concentration is at or above 0.065 ppm.

In order to quickly ascertain relevant circumstances, the preliminary ozone assessments would use non-quality-assured data provided by the MDEQ. As part of the annual NAAQS assessment, quality-assured ozone data would be reviewed to determine if the preliminary ozone monitoring data were valid or if monitored high ozone concentrations were due to monitor malfunctions.

If high-ozone events occur within the planning area, a summary of events and a discussion of relevant meteorological data and circumstances would be developed as part of the annual NAAQS assessment. These summaries and the underlying data may provide important information that can be used to predict potential occurrences of high-ozone events and to identify mitigation measures and/or proactive measures that could prevent future events.

4.3 Annual AQRV Assessment

Federal land managers track the status, condition, and trends of AQRVs for Class I and sensitive Class II areas under their jurisdictions. Consequently, the BLM would request visibility, sulfur and nitrogen deposition, and lake acid neutralizing capacity data from the FS, FWS, and NPS and would include agency-submitted data in the BLM's annual review of AQRV trends. The annual review would also include AQRV data from any Class I or sensitive Class II areas under BLM jurisdiction.

Based on these reviews, the BLM would maintain an awareness of AQRV trends. However, it should be noted that the reviews would not necessarily link AQRV trends to oil and gas development. AQRV impacts are often associated with pollutants that can be transported long distances from many different types of sources. For example, visibility degradation in eastern Montana primarily results from large stationary sources such as electric generating units and cement kilns, as addressed in the Montana Regional Haze Federal Implementation Plan (EPA 2012b).

Photochemical grid modeling (PGM) would be completed after the ROD is signed and would provide additional information concerning the potential impact BLM-authorized of oil and gas emissions and cumulative emissions on AQRVs.

5.0 FUTURE MODELING

The BLM committed to perform PGM in order to assess regional air quality and AQRV impacts. Due to insufficient monitoring and regional emissions data available during development of the RMP, PGM will not be completed prior to issuance of the RMP/EIS and the ROD. In order to complete PGM expeditiously, the BLM began data acquisition and initiated steps needed to proceed with PGM. When PGM is completed and the results assessed, the BLM may identify additional emission mitigation measures for oil and gas activity.

5.1 Photochemical Grid Modeling

Comprehensive regional air quality and AQRV regional modeling of emission sources within the BiFO and surrounding areas requires PGM. This type of modeling can predict ozone and regional haze impacts, for which major pollutants and precursors can be transported many hundreds of miles.

5.1.1 Data Acquisition

PGM requires three main types of concurrent data: meteorological data, ambient monitoring data, and comprehensive emission data. BLM's analysis determined that the latter two types of data need to be augmented and updated prior to performing PGM.

5.1.1.1 Additional Monitoring

Ambient monitoring data throughout the regional PGM domain (which would extend throughout most of Montana and into adjacent states) are needed in order to validate model performance, which is assessed by modeling a previous year and comparing the model's predicted concentrations to actual monitored concentrations.

In cooperation with the MDEQ, the BLM funded two new monitoring stations in north-central Montana and would provide staffing and additional funding to operate the monitors. One monitor is located near Malta in Phillips County and the other is located in Lewistown (Fergus County). Both monitors became operational in July 2012 and measure ambient concentrations of nitric oxide (NO), NO_2, nitrogen oxides (NO_x, an ozone precursor), ozone, PM_{10}, and $PM_{2.5}$. These data would be particularly helpful in assessing the photochemical grid model's ability to accurately predict concentrations of these pollutants and its ability to accurately predict regional haze and visibility impacts.

5.1.1.2 Updating Emission Inventories

Comprehensive emission inventories are also critically important in predicting cumulative air quality and AQRV impacts. Current oil and gas regional emission inventories for Montana and the Dakotas are known to lack important emission sources, particularly sources of volatile organic compounds (VOCs), which contribute to ozone formation. The existing oil and gas inventories for the Williston and Central Montana Basins represent the year 2002 and were developed as part of the Western Regional Air Partnership (WRAP) Phase II inventory. Since then, 2006 Phase III emission inventories have been developed for oil and gas basins within Colorado, Utah, Wyoming, and New Mexico, but have not yet been completed for Montana, North Dakota, and South Dakota. The Phase III inventories have more comprehensive emission inventories of VOC sources at oil and gas facilities.

The BLM Montana and Dakotas State Office is providing financial assistance to the WRAP so that Phase III oil and gas emission inventories can be completed in 2013 for the Williston Basin and the Central

Montana Basin. These inventories would represent calendar year 2011 emissions. In addition to covering the planning area, the inventories would include comprehensive recent emission estimates for oil and gas activity in North Dakota and South Dakota.

5.1.2 PGM Schedule

In order to use a full 12 months of ambient monitoring data from the new Malta and Lewistown monitors, the baseline year for PGM is expected to be 2013 or may be a 12-month period beginning in late 2012 and ending in 2013. PGM planning began in 2012 and development of the PGM modeling protocol was completed in 2013. Modeling activities will begin in 2014 and should be completed in mid-2015. Review and assessment of PGM results would be completed in fall 2015. Table 2 provides the planned data acquisition and PGM schedule.

Table 2. Data Acquisition and PGM Schedule

Task / Subtask	Completion Date
Pre-Modeling Emission Inventory and Protocol Development	
Develop Weather Research Forecasting (WRF) and PGM Protocol	4/15/2013
”WRAP” Williston and Great Plains Basin Inventory *	3/31/2014
Base Year Modeling and Evaluation *	
WRF Modeling	5/8/2014
Draft WRF Model Evaluation	6/5/2014
AQTW, MDEQ, and IWG WRF Evaluation Review	7/10/2014
Emission Modeling (Base and Future Year) & Report	9/9/2014 (base year) 12/11/2014 (future year)
AQTW, MDEQ, and IWG Emission Modeling Review	10/2/2014 (base year) 1/7/2015 (future year)
Base Year Photochemical Grid Modeling	8/28/2014
Draft Base Year PGM Evaluation	11/17/2014
AQTW, MDEQ, and IWG PGM Evaluation Review	12/1/2014
Finalize WRF and PGM Evaluations	12/15/2014
Emission Modeling Reports	1/21/2015
Future Year Modeling and Evaluation *	
Future Year Photochemical Grid Modeling	3/8/2015
Analyze Air Quality and AQRV Impacts	3/29/2015
Draft ARTSD	4/19/2015
AQTW, MDEQ, and IWG ARTSD Review	6/19/2015
Finalize ARTSD	7/1/2015

* Duration and dates are subject to revision; they are estimated to provide the general timing of future modeling activities.
AQTW = Air Quality Technical Workgroup
ARTSD = Air Resource Technical Support Document
IWG = Interagency Working Group
MDEQ = Montana Department of Environmental Quality
PGM = Photochemical grid modeling
RFP = Request for Proposal
WRF = Weather Research and Forecasting Model
WRAP = Western Regional Air Partnership

The Weather Research and Forecasting (WRF) model would be used to model meteorological conditions. The Comprehensive Air Quality Model with Extensions (CAMx) would be used for photochemical grid modeling. In addition, multiple models would be used to develop and process emission inventories for input into the photochemical grid model. When modeling is completed, an Air Resource Technical Support Document (ARTSD) would be developed.

Initial PGM would include future year modeling for a year between 2017 and 2030. The specific year would be determined by the BLM based on the ability to predict future regional oil and gas emissions in the Williston and Central Montana Basins. After initial PGM is completed, the BLM would begin an assessment process to determine when or if additional PGM updates are needed. Factors to be considered in determining when additional PGM would be needed include: 1) the adequacy of the adaptive management strategy to maintain good air quality, and 2) the level of BLM-authorized oil and gas activity and emissions compared to modeled levels.

5.1.3 MDEQ and AQTW and IWG Review and Input to PGM

Throughout the PGM data collection and modeling process, the BLM would work collaboratively with the MDEQ and the, with the IWG, and with other agencies or Tribes that request to be involved in the PGM effort. These collaborators provided technical review and comment on the draft modeling protocol, and will provide input on the WRF and PGM performance evaluations, and on the draft ARTSD. Substantial time has been included in the schedule shown in Table 2 to allow adequate review and comment periods during the PGM process.

5.1.4 Availability of PGM Results

Future PGM results would be presented in the final ARTSD and in a summary of the results. The ARTSD and summary document would be posted on the BiFO BLM website. In addition, the modeling protocol document would be provided via the website when the photochemical modeling ARTSD is made available. Outreach information regarding the availability of the results would be made through the AQTW, IWG, and other agencies involved in the PGM process, as well as other interested parties.

5.2 Post- PGM Modeling

To the extent that future emission increases are within the levels modeled with PGM or other modeling and are proximate to modeled emission locations, far-field air quality and AQRV impact analysis may incorporate by reference PGM and other modeling results. The BLM and the AQTW would determine whether previous modeling is sufficient to satisfy MOU requirements. This air quality management approach is consistent with the MOU (USDA 2011) and allows for efficient air quality and AQRV impact analysis.

If additional modeling is performed after PGM is complete, an assessment of air quality and AQRV impacts would be made and, if necessary, additional mitigation measures may be identified.

6.0 MITIGATION

Air quality and AQRV impact mitigation would involve two types of mitigation: 1) initial mitigation measures that become effective when the ROD is signed, and 2) enhanced mitigation measures that may be identified based on future ambient monitoring data or modeling results.

6.1 Initial Mitigation Actions

The following air quality mitigation measures would be applied upon issuance of the ROD through leasing documents and project-specific NEPA documents. To the extent practical, emission reductions associated with these mitigation measures have been included in the emission inventory.

1. Design and construct roads and well pads to reduce the amount of fugitive dust generated by traffic or other activities. During construction activities, apply water, apply dust-suppression chemicals, apply gravel, or use other control methods to achieve 50 percent fugitive dust control efficiency, except when ground is wet or frozen.

2. Use water or other BLM-approved dust suppression during drilling, completion, and well workover operations for dust abatement on access roads, as needed, to achieve a 50 percent fugitive dust control efficiency, except when ground is wet or frozen.

3. Use water or other BLM-approved dust suppression in high traffic areas during production operations for dust abatement, as needed, to achieve 50 percent fugitive dust control efficiency, except when ground is wet or frozen. Operators would work with local government agencies to improve dust suppression on roads.

4. For oil and gas Project Plans of Development (PODs), oil and gas operators would establish speed limits for project-required unpaved roads in and adjacent to the project area; oil and gas operator employees would comply with these speed limits.

5. For oil and gas Project PODs, oil and gas operators would be encouraged to reduce surface disturbance, vehicle traffic, and fugitive dust emissions by consolidating facilities (e.g., using multi-well pads, storage vessels) when feasible.

6. Diesel drill rig and completion engines greater than 200 hp would meet Tier 4 emission standards for non-road diesel engines. Alternatively, oil and gas operators may use drill rig and completion engines that exceed Tier 4 emission standards if modeling or monitoring at the project level or programmatic level demonstrates compliance with the NAAQS and protection of AQRVs.

7. For hydraulically fractured gas wells that do not qualify as “low pressure wells”, “wildcat,” or “delineation” wells, oil and gas operators would comply with reduced emissions completion (REC) requirements specified in Subpart OOOO, Standards of Performance for Crude Oil and Natural Gas Production, Transmission and Distribution (40 CFR §60.5375) within six months of ROD issuance.

8. Non-road diesel engines would be required to use ultra-low sulfur diesel fuel (15 ppmw) as required by 40 CFR §80.610(e)(3)(iii).

9. Natural-gas-fired or electrical compressors or generators would be required at compressor stations in the Powder River Basin.

10. CBNG operators proposing a POD within 5 miles of the Northern Cheyenne IR or the Crow IR would be required to provide the information necessary for BLM to conduct an analysis of air quality impacts. The BLM would use the information to determine the impact on air quality in the Northern Cheyenne IR and the Crow IR, disclose the analysis results and subsequent mitigation in the appropriate NEPA document, and consult with the Tribes when the analysis shows that air quality or AQRV impacts are anticipated from a specific development proposal.

11. CBNG operators within 5 miles of the Northern Cheyenne IR and the Crow IR may be required to restrict the timing or location of CBNG development if monitoring or modeling by the MDEQ finds their CBNG development is causing or threatening to cause noncompliance with applicable local, state, tribal, and federal air quality laws, regulations, and standards, as well as state implementation plans developed by the MDEQ.

6.2 Monitoring-Based Mitigation

Enhanced mitigation would be evaluated and implemented if ambient monitoring data at monitor(s) located in oil and gas activity areas within the planning area indicate that pollutant concentrations are approaching or threatening the NAQQS or MAAQS. Prior to completion of initial PGM, monitoring-based thresholds would be based on evaluation of exceedances of the NAAQS, as described in Section 6.2.1. After completion of initial PGM, monitoring-based thresholds would be based on BLM-calculated design values, as described in Section 6.2.3.

6.2.1 Monitoring-Based Thresholds Before PGM Completion

Based on requests from EPA during the MOU review process, the BLM would review NAAQS exceedances and determine if enhanced mitigation would be warranted during the interim period between ROD issuance and PGM completion. The BLM would require enhanced mitigation for BLM-authorized oil and gas activities if there is a monitored exceedance of the NAAQS at the St. Luke's monitor, unless the BLM determines that enhanced mitigation is not warranted after completing specified steps as outlined below and in Section 6.2.2.

1. The BLM would notify the EPA and the MDEQ within 30 days after St. Luke's monitoring data showing an exceedance has been posted on EPA's Air Quality System (AQS). The notification would state that the BLM is reviewing the exceedance according to this procedure.

2. After consulting with the MDEQ, the BLM would determine whether an exceptional event[1] may have caused the exceedance.

- If the MDEQ informs the BLM that an exceptional event likely caused the exceedance, the BLM would provide a letter to that effect to the EPA. No further action would be necessary.

- If an exceptional event did not cause the exceedance or if MDEQ would not submit an exceptional event waiver to EPA, the BLM would perform Step 3.

3. The BLM would conduct a screening level analysis[2] to determine the likely source and location of the exceedance and whether mitigation is needed.[3]

[1] The BLM would not formally decide that an exceptional event occurred as this decision would be made by MDEQ. Until a final determination of an exceptional event is presented to EPA by MDEQ, and the EPA has concurred, the BLM would assume that an exceptional event occurred based on a stated intention by the MDEQ to submit an exceptional event waiver.

- If the screening analysis indicates that the exceedance was not caused by BLM-authorized oil and gas source(s) within the planning area or indicates that the BLM-authorized oil and gas source(s) within the planning did not contribute to the exceedance, the BLM would convey this finding in writing to the MDEQ and EPA for review and comment. No further action would be necessary.

- If the screening analysis indicates that the exceedance was caused or contributed to by BLM-authorized oil and gas sources inside the planning area, the BLM would perform Step 4.

4. The BLM would consult with the MDEQ and EPA to determine whether there is a need for: 1) a refined attribution analysis (e.g., attribution test using CAMx ozone source attribution technology or anthropogenic precursor's culpability assessment) or 2) mitigation on BLM-authorized oil and gas emission sources within the planning area. If the refined analysis:

- Is warranted, BLM would perform the refined analysis within 6 months of completing Step 3 in consultation with MDEQ and EPA.
- Indicates that the exceedance was not caused or contributed to by BLM-authorized oil and gas sources inside the planning area, the BLM would provide that recommendation to the MDEQ and EPA for review and comment. No further action would be necessary.
- Indicates that the exceedance was caused by BLM-authorized oil and gas sources within the planning area, the BLM would evaluate enhanced mitigation measures, as described in Section 6.2.2.

6.2.2 Determination of Enhanced Mitigation Measures Before PGM Completion

If a NAAQS exceedance occurs prior to completion of PGM and the refined analysis in Step 4 above determined that the exceedance was caused by BLM-authorized oil and gas sources within the planning area, enhanced mitigation measures would be evaluated and selected by the BLM, in cooperation with the MDEQ, IWG, and AQTW, when appropriate. Preference would be given to mitigation methods that the MDEQ intends to impose as new regulations or air quality permitting provisions. Selected mitigation measures would be implemented within one year after the BLM decision to apply additional mitigation.

Potential enhanced mitigation measures include the measures listed below based on current information concerning potential emission reduction technologies. Additional measures or equivalent methods or emission restrictions may be identified in the future.

- Drilling and/or blowdown activity restrictions based on meteorological conditions
- Construction activity restrictions based on meteorological conditions
- Centralization of gathering facilities
- Electric drill rigs

[2] Publically available web based applications suggested by EPA to identify sources of air pollution and potential impacts include the following sites: trajectory analysis tools like HySplit (http://ready.arl.noaa.gov/), air quality data at the EPA's AQS site (http://airnow.gov), state regulatory agency sites and airnowtech.org, an interactive snow site (http://www.nohrsc.nws.gov/interactive/html/map.html), daily ozone modeling (http://airquality.weather.gov/), daily ozone and $PM_{2.5}$ modeling site (http://www.getbluesky.org/), and daily satellite imagery site (http://ge.ssec.wisc.edu/modis-today/).
[2] If data necessary to conduct a screening level analysis is not available, the BLM would consult with the MDEQ and the EPA regarding source attribution and the need for mitigation.

- Field electrification for compressors and/or pumpjack engines
- Plunger lift systems with smart automation
- Oil tank load out vapor recovery
- VOC controls on tanks with a potential to emit less than 5 tons per year
- Selective catalytic reduction on non-drill rig stationary engines
- Reduced emission completions beyond those required by EPA regulations, if determined to be technically and economically feasible
- Well pad density limitations
- Reducing the total number of drill rigs operating simultaneously
- Seasonally reducing or ceasing drilling during specified periods
- Using only lower-emitting drill and completion rig engines during specified time periods
- Using natural gas-fired drill and completion rig engines
- Replacing internal combustion engines with gas turbines for natural gas compression
- Employing a monthly forward looking infrared (FLIR) leak detection program to reduce VOCs
- Tank load out vapor recovery
- Enhanced VOC emission controls with 95% control efficiency on additional production equipment having a potential to emit of greater than 5 tons/year
- Enhanced direct inspection and maintenance program

6.2.3 Monitoring-Based Thresholds After PGM Completion

By May 31 of each year following completion of PGM, the BLM would calculate design values for each pollutant monitored at a federal reference monitor within the planning area and identified as a representative monitor in Section 6.2.1. The design value would be calculated based on calendar year monitoring data available at the time. For pollutants requiring three years of monitoring data for design value calculation, data from the appropriate prior period would be used. For example, based on PGM completion in mid-2015, the first annual design value calculation would be performed by May 31, 2016 and would include monitoring data for calendar years 2013, 2014, and 2015 for three-year design values and on monitoring data for calendar year 2015 for single-year design values. BLM design value calculations would exclude data associated with MDEQ-identified exceptional events and would be performed in accordance with EPA regulations and guidance.

Calculation methods would, to the extent possible, follow EPA procedures provided in the following appendices within Title 40 of the Code of Federal Regulations (CFR), Part 50 in effect as of December 1, 2012. These procedures may be updated by future EPA regulations and this section of the ARMP would be revised to reflect changing regulations.

- NO_2 (Appendix S)
- O_3 (appendix P)
- PM_{10} (Appendix K)
- $PM_{2.5}$ (Appendix N)
- SO_2 (Appendix T)

BLM design value calculations would exclude data associated with exceptional events identified by MDEQ.

6.2.4 Determination of Enhanced Mitigation Measures After PGM Completion

If the air quality assessment described in Section 6.2.3 indicates that a BLM-calculated design value is greater than 85 percent of a NAAQS, enhanced mitigation measures addressing that pollutant or pollutant precursor would be evaluated and selected by the BLM, in cooperation with the MDEQ, IWG, and EPA, when appropriate. Potential enhanced mitigation measures include the measures listed above in Section 6.1, as well as additional measures that may be identified in the future.

6.3 Modeling-Based Mitigation

6.3.1 Modeling-Based Thresholds

Future modeling would assess air quality and AQRV impacts from future BLM-authorized oil and gas activity and would include regional PGM and project-specific modeling. Modeling-based thresholds for evaluating enhanced mitigation would include potential future impacts on NAAQS or MAAQS or impacts above specific levels of concern for AQRVs in Class I or sensitive Class II areas (as identified on a case-by-case basis by MDEQ or a federal land management or tribal agency).

6.3.2 Modeling-Based Enhanced Mitigation Measures

If BLM-authorized oil and gas activity is predicted to cause or contribute to impacts above the thresholds described above, the BLM would facilitate an interagency process to ensure that a comprehensive strategy is developed to manage air quality impacts from future oil and gas development within the region. The local, state, federal, and Tribal agencies involved in the regulation of air quality and the authorization of oil and gas development would evaluate modeling results from future modeling studies and identify potential air quality concerns and necessary reductions in air emissions. If the modeling predicts significant impacts, these agencies would use their respective authorities to implement enhanced emission control strategies, operating limitations, equipment standards, and/or pacing of development as necessary to ensure continued compliance with applicable ambient air quality standards, including the enhanced mitigation measures listed in Section 6.2.2, other future mitigation measures identified through BLM's adaptive management strategy, or reasonable mitigation measures suggested by the MDEQ, IWG, or AQTW. If necessary, implementation of mitigation measures would occur within one year of obtaining final modeling results for mitigation measures that conform to currently implemented land use planning decisions and constraints.

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Appendix U:
Water Rights

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U. **Water Rights**

BLM manages the land for multiple uses and, when required, applies to the State of Montana for water rights to support these uses. The BLM holds water rights for such beneficial uses as livestock water, fisheries and waterfowl and wildlife. Most BLM water sources have more than one water right attached to them to protect the varying uses listed above.

Water Rights

County	BLM Adjudication Claims	BLM Permits	Total Water Rights
BigHorn	92	22	7518
Carbon	231	36	6224
Golden Valley	0	0	2231
Musselshell	228	29	3714
Stillwater	4	5	5849
Sweet Grass	14	1	7042
Wheatland	0	0	3694
Yellowstone	153	29	9048
Totals	722	122	45320

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Appendix V:
Recreational Setting Characteristics

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V. Recreational Setting Characteristics

Primitive Classification:

- Physical:
  - More than ½ mile from either mechanized or motorized routes.
  - Undisturbed natural landscape.
  - No structures. Foot/horse and water trails only.

- Social:
  - Fewer than 3 encounters/day at camp sites and fewer than 6 encounters/day on travel routes.
  - Fewer than or equal to 3 people per group.
  - No alteration of the natural terrain. Footprints only observed. Sounds of people rare.

- Operational:
  - Foot, horse, and non-motorized float boat travel.
  - No maps or brochures available on-site. Staff is rarely present to provide on-site assistance.
  - No on-site posting/signing of visitor regulations, interpretive information or ethics. Few use restrictions

Back Country Classification

- Physical:
  - Within ½ mile of four-wheel drive vehicle, ATV and motorcycles routes.
  - Character of the natural landscape retained. A few modifications contrast with character of the landscape (e.g. fences, primitive roads).
  - Maintained and marked trails, simple trailhead developments and basic toilets.

- Social:
  - 3-6 encounters/day off travel routes (e.g., campsites) and 7-15 encounters/day on travel routes
  - 4-6 people per group.
  - Areas of alteration uncommon. Little surface vegetation wear observed. Sounds of people infrequent.

- Operational:
  - Mountain bikes and perhaps other mechanized use, but all is non-motorized.
  - Basic maps, staff infrequently present (e.g. seasonally, high use periods) to provide on-site assistance.
  - Basic user regulations at key access points. Minimum use restrictions.

Middle Country Classification:

- Physical:
  - Within ½ mile of four-wheel drive vehicle, ATV and motorcycles routes.
  - Character of the natural landscape retained. A few modifications contrast with character of the landscape (e.g. fences, primitive roads).
  - Maintained and marked trails, simple trailhead developments and basic toilets.

- Social:
  - 7-14 encounters/day off travel routes (e.g., staging areas) and 15-29 encounters/ day on travel routes
  - 7-12 people per group.
  - Small areas of alteration. Surface vegetation showing wear with some bare soils. Sounds of people occasionally heard.

- Operational
  - Four-wheel drives, all-terrain vehicles, dirt bikes, or snowmobiles in addition to non-motorized, mechanized use.
  - Area brochures and maps, staff is occasionally (e.g. most weekends) present to provide on-site assistance.
  - Some regulatory and ethics signing. Moderate use restrictions. (e.g. camping, human waste).

Front Country Classification

- Physical:
  - Within ½ mile of low-clearance or passenger vehicle routes (includes unpaved County roads and private land routes).
  - Character of the natural landscape partially modified but none overpower natural landscape (e.g. roads, structures, utilities).
  - Rustic facilities such as campsites, restrooms, trailheads, and interpretive displays.

- Social:
  - 15-29 encounters/day off travel routes (e.g., campgrounds) and 30 or more encounters/day on travel routes.
  - 13-25 people per group.
  - Small areas of alteration prevalent. Surface vegetation gone with compacted soils observed. Sounds of people regularly heard

- Operational:
  - Two-wheel drive vehicles predominant, but also four wheel drives and non-motorized, mechanized use.
  - Information materials describe recreation areas & activities, staff periodically present (e.g. weekdays & weekends).
  - Rules, regulations and ethics clearly posted. Use restrictions, limitations and/or closures.

Rural Classification

- Physical:
  - Within ½ mile of paved/primary roads and highways.
  - Character of the natural landscape considerably modified (agriculture, residential or industrial).
  - Modern facilities such as campgrounds, group shelters, boat launches, and occasional exhibits.

- Social:
  - People seem to be generally everywhere.
  - 26-50 people per group.
  - A few large areas of alteration. Surface vegetation absent with hardened soils. Sounds of people frequently heard.

- Operational:
  - Ordinary highway auto and truck traffic is characteristic.
  - Information described to the left, plus experience and benefit descriptions, staff regularly present (e.g. almost daily).
  - Regulations strict and ethics prominent. Use may be limited by permit, reservation, etc.

Urban Classification

- Physical:
  - Within ½ mile of streets and roads within municipalities and along highways.
  - Urbanized developments dominate landscape.
  - Elaborate full-service facilities such as laundry, restaurants, and groceries.

- Social:
  - Busy place with other people constantly in view.
  - Greater than 50 people per group.
  - Large areas of alteration prevalent. Some recreation. Constantly hear people.

- Operational:
  - Wide variety of street vehicles and highway traffic is ever-present.
  - Information described to the left, plus regularly scheduled on-site outdoor demonstrations and clinics.
  - Enforcement in addition to rules to reduce conflicts, hazards, and resource damage.

Appendix W:
Pompeys Pillar Designations

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Establishment of Pompeys Pillar National Monument

January 17, 2001

THE WHITE HOUSE

Office of the Press Secretary

For Immediate Release January 17, 2001

ESTABLISHMENT OF THE POMPEYS PILLAR NATIONAL MONUMENT

- - - - - - -

BY THE PRESIDENT OF THE UNITED STATES OF AMERICA

A PROCLAMATION

Pompeys Pillar National Monument is a massive sandstone outcrop that rises from an almost two-acre base on the banks of the Yellowstone River 150 feet toward Montana's Big Sky, east of Billings. The monument's premier location at a natural ford in the Yellowstone River, and its geologic distinction as the only major sandstone formation in the area, have made Pompeys Pillar a celebrated landmark and outstanding observation point for more than eleven thousand years of human occupation. Hundreds of markings, petroglyphs, and inscriptions left by visitors have transformed this geologic phenomenon into a living journal of the American West.

The monument's most notable visitor, Captain William Clark of the Lewis and Clark Expedition, arrived at Pompeys Pillar on July 25, 1806, on his return trip from the Pacific coast. Clark's journal recorded his stop at this "remarkable rock" with its "extensive view in every direction." He described an idyllic landscape of grassy plains, snow-capped mountains, and cliffs abutting the wandering river. Clark marked his presence by engraving his name and the date of his visit on the outcrop. This simple inscription is the only remaining physical evidence of Lewis and Clark's epic journey. In his journal, Clark named the rock Pompy's Tower, Pompy being Clark's nickname for Sacagawea's young son, Jean Baptiste Charbonneau, who was born at the expedition's winter camp at Fort Mandan on February 11, 1805. The name was changed to Pompeys Pillar by author Nicholas Biddle when his account of the Expedition was published in 1814.

Ethnographic and archaeological evidence indicates that the Pillar was a place of ritual and religious activity. Hundreds of petroglyphs on the face of the rock, noted by Clark in his journal, reflect the importance of the monument to early peoples. The Crow people, the dominant residents of the region when Clark passed through, call the pillar the "Mountain Lions Lodge" in their language, and it figures prominently in Crow oral history. Pompeys Pillar also includes the markings and signature of a host of characters from the pioneer past, including fur trappers, Yellowstone River steamboat men, frontier army troops, railroad workers, missionaries, and early settlers. In 1873, Lieutenant Colonel George Armstrong Custer and his men camped at its base, where they came under attack from Sioux snipers.

Section 2 of the Act of June 8, 1906 (34 Stat. 225, 16 U.S.C. 431), authorizes the President, in his discretion, to declare by public proclamation historic landmarks, historic and prehistoric structures, and other objects of historic or scientific interest that are situated upon the lands owned or controlled by the Government of the United States to be national monuments, and to reserve as a part thereof parcels of land, the limits of which in all cases shall be confined to the smallest area compatible with the proper care and management of the objects to be protected.

WHEREAS it appears that it would be in the public interest to reserve such lands as a national monument to be known as the Pompeys Pillar National Monument:

NOW, THEREFORE, I, WILLIAM J. CLINTON, President of the United States of America, by the authority vested in me by section 2 of the Act of June 8, 1906 (34 Stat. 225, 16 U.S.C. 431), do proclaim that there are hereby set apart and reserved as the Pompeys Pillar National Monument, for the purpose of protecting the objects identified above, all lands and interests in lands owned or controlled by the United States within the boundaries of the area described on the map entitled "Pompeys Pillar National Monument" attached to and forming a part of this proclamation. The Federal land and interests in land reserved consist of approximately 51 acres, which is the smallest area compatible with the proper care and management of the objects to be protected.

All Federal lands and interests in lands within the boundaries of this monument are hereby appropriated and withdrawn from all forms of entry, location, selection, sale, or leasing or other disposition under the public land laws, including but not limited to withdrawal from location, entry, and patent under the mining laws, and from disposition under all laws relating to mineral and geothermal leasing. Lands and interests in lands within the proposed monument not owned by the United States shall be reserved as a part of the monument upon acquisition of title thereto by the United States.

The Secretary of the Interior shall manage the monument through the Bureau of Land Management, pursuant to applicable legal authorities, to implement the purposes of this proclamation.

The establishment of this monument is subject to any valid existing rights, including the mineral estate held by the United States in trust for the Crow Tribe.

Nothing in this proclamation shall be deemed to enlarge or diminish the jurisdiction of the State of Montana with respect to fish and wildlife management.

This proclamation does not reserve water as a matter of Federal law. Nothing in this reservation shall be construed as a relinquishment or reduction of any water use or rights reserved or appropriated by the United States on or before the date of this proclamation. The Secretary shall work with appropriate State authorities to ensure that any water resources needed for monument purposes are available.

Nothing in this proclamation shall be deemed to revoke any existing withdrawal, reservation, or appropriation; however, the national monument shall be the dominant reservation. Warning is hereby given to all unauthorized persons not to appropriate, injure, destroy, or remove any feature of this monument and not to locate or settle upon any of the lands thereof.

IN WITNESS WHEREOF, I have hereunto set my hand this seventeenth day of January, in the year of our Lord two thousand one, and of the Independence of the United States of America the two hundred and twenty-fifth.

WILLIAM J. CLINTON

# # #

Federal Register Notice of Establishment of

Pompeys Pillar National Monument

January 22, 2001

Federal Register / Vol. 66, No. 14 / Monday, January 22, 2001 / Presidential Documents 7351

Presidential Documents

Proclamation 7396 of January 17, 2001

Establishment of the Pompeys Pillar National Monument

By the President of the United States of America

A Proclamation

Pompeys Pillar National Monument is a massive sandstone outcrop that rises from an almost two-acre base on the banks of the Yellowstone River 150 feet toward Montana's Big Sky, east of Billings. The monument's premier location at a natural ford in the Yellowstone River, and its geologic distinction as the only major sandstone formation in the area, have made Pompeys Pillar a celebrated landmark and outstanding observation point for more than eleven thousand years of human occupation. Hundreds of markings, petroglyphs, and inscriptions left by visitors have transformed this geologic phenomenon into a living journal of the American West.

The monument's most notable visitor, Captain William Clark of the Lewis and Clark Expedition, arrived at Pompeys Pillar on July 25, 1806, on his return trip from the Pacific coast. Clark's journal recorded his stop at this "remarkable rock" with its "extensive view in every direction." He described an idyllic landscape of grassy plains, snow-capped mountains, and cliffs abutting the wandering river. Clark marked his presence by engraving his name and the date of his visit on the outcrop. This simple inscription is the only remaining physical evidence of Lewis and Clark's epic journey. In his journal, Clark named the rock Pompy's Tower, Pompy being Clark's nickname for Sacagawea's young son, Jean Baptiste Charbonneau, who was born at the expedition's winter camp at Fort Mandan on February 11, 1805. The name was changed to Pompeys Pillar by author Nicholas Biddle when his account of the Expedition was published in 1814.

Ethnographic and archaeological evidence indicates that the Pillar was a place of ritual and religious activity. Hundreds of petroglyphs on the face of the rock, noted by Clark in his journal, reflect the importance of the monument to early peoples. The Crow people, the dominant residents of the region when Clark passed through, call the pillar the "Mountain Lions Lodge" in their language, and it figures prominently in Crow oral history. Pompeys Pillar also includes the markings and signature of a host of characters from the pioneer past, including fur trappers, Yellowstone River steamboat men, frontier army troops, railroad workers, missionaries, and early settlers. In 1873, Lieutenant Colonel George Armstrong Custer and his men camped at its base, where they came under attack from Sioux snipers.

Section 2 of the Act of June 8, 1906 (34 Stat. 225, 16 U.S.C. 431), authorizes the President, in his discretion, to declare by public proclamation historic landmarks, historic and prehistoric structures, and other objects of historic or scientific interest that are situated upon the lands owned or controlled by the Government of the United States to be national monuments, and to reserve as a part thereof parcels of land, the limits of which in all cases shall be confined to the smallest area compatible with the proper care and management of the objects to be protected.

WHEREAS it appears that it would be in the public interest to reserve such lands as a national monument to be known as the Pompeys Pillar National Monument:

NOW, THEREFORE, I, WILLIAM J. CLINTON, President of the United States of America, by the authority vested in me by section 2 of the Act of June 8, 1906 (34 Stat. 225, 16 U.S.C. 431), do proclaim that there are hereby set apart and reserved as the Pompeys Pillar National Monument, for the purpose of protecting the objects identified above, all lands and interests in lands owned or controlled by the United States within the boundaries of the area described on the map entitled "Pompeys Pillar National Monument" attached to and forming a part of this proclamation. The Federal land and interests in land reserved consist of approximately 51 acres, which is the smallest area compatible with the proper care and management of the objects to be protected.

All Federal lands and interests in lands within the boundaries of this monument are hereby appropriated and withdrawn from all forms of entry, location, selection, sale, or leasing or other disposition under the public land laws, including but not limited to withdrawal from location, entry, and patent under the mining laws, and from disposition under all laws relating to mineral and geothermal leasing.

Lands and interests in lands within the proposed monument not owned by the United States shall be reserved as a part of the monument upon acquisition of title thereto by the United States.

The Secretary of the Interior shall manage the monument through the Bureau of Land Management, pursuant to applicable legal authorities, to implement the purposes of this proclamation.

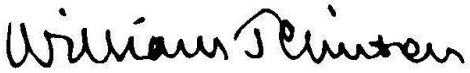
The establishment of this monument is subject to any valid existing rights, including the mineral estate held by the United States in trust for the Crow Tribe.

Nothing in this proclamation shall be deemed to enlarge or diminish the jurisdiction of the State of Montana with respect to fish and wildlife management.

This proclamation does not reserve water as a matter of Federal law. Nothing in this reservation shall be construed as a relinquishment or reduction of any water use or rights reserved or appropriated by the United States on or before the date of this proclamation. The Secretary shall work with appropriate State authorities to ensure that any water resources needed for monument purposes are available.

Nothing in this proclamation shall be deemed to revoke any existing withdrawal, reservation, or appropriation; however,the national monument shall be the dominant reservation. Warning is hereby given to all unauthorized persons not to appropriate, injure, destroy, or remove any feature of this monument and not to locate or settle upon any of the lands thereof.

IN WITNESS WHEREOF, I have hereunto set my hand this seventeenth day of January, in the year of our Lord two thousand one, and of the Independence of the United States of America the two hundred and twenty-fifth.



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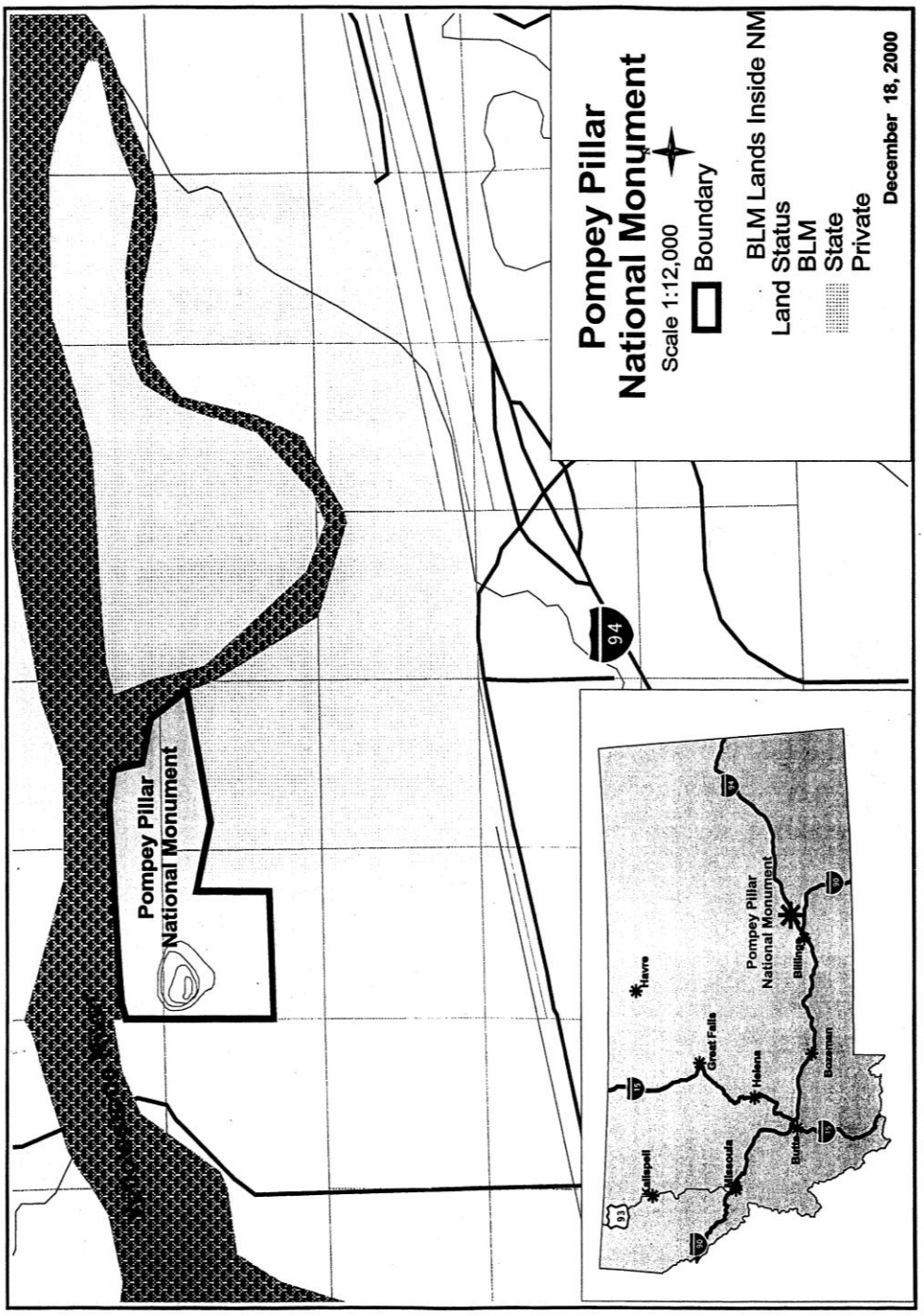

[FR Doc. 01–2101

Filed 1–19–01; 8:45 am]

Billing code 3195–01–C

Pompeys Pillar National Register of Historic Places
September 20, 1983

XI Advance of the Frontier, 1763 to 1830
Lewis and Clark Expedition

FHR-8-250 (10/78)

UNITED STATES DEPARTMENT OF THE INTERIOR
HERITAGE CONSERVATION AND RECREATION SERVICE

NATIONAL REGISTER OF HISTORIC PLACES INVENTORY-NOMINATION FORM

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SEE INSTRUCTIONS IN *HOW TO COMPLETE NATIONAL REGISTER FORMS*
TYPE ALL ENTRIES -- COMPLETE APPLICABLE SECTIONS

1 NAME

HISTORIC: Pompeys Pillar

AND/OR COMMON: Pompeys Pillar/Pompy's Tower

2 LOCATION

STREET & NUMBER: about 2 miles east of Nibbe, Montana — __NOT FOR PUBLICATION

CITY, TOWN: Nibbe, Montana — XX VICINITY OF — CONGRESSIONAL DISTRICT: 2nd

STATE: Montana — CODE: 30 — COUNTY: Yellowstone — CODE: 111

3 CLASSIFICATION

CATEGORY	OWNERSHIP	STATUS	PRESENT USE	
__DISTRICT	__PUBLIC	XXOCCUPIED	__AGRICULTURE	__MUSEUM
__BUILDING(S)	X PRIVATE	__UNOCCUPIED	__COMMERCIAL	XX PARK
__STRUCTURE	__BOTH	__WORK IN PROGRESS	__EDUCATIONAL	__PRIVATE RESIDENCE
XX SITE	**PUBLIC ACQUISITION**	**ACCESSIBLE**	__ENTERTAINMENT	__RELIGIOUS
__OBJECT	__IN PROCESS	XX YES: RESTRICTED	__GOVERNMENT	__SCIENTIFIC
	__BEING CONSIDERED	__YES: UNRESTRICTED	__INDUSTRIAL	__TRANSPORTATION
		__NO	__MILITARY	__OTHER:

4 OWNER OF PROPERTY

NAME: Stella Foote

STREET & NUMBER: 1207 Hillhayen Way

CITY, TOWN: Billings, — __ VICINITY OF — STATE: Montana

5 LOCATION OF LEGAL DESCRIPTION

COURTHOUSE, REGISTRY OF DEEDS, ETC.: Yellowstone County Courthouse

STREET & NUMBER:

CITY, TOWN: Billings — STATE: Montana

6 REPRESENTATION IN EXISTING SURVEYS

TITLE: none known

DATE: __FEDERAL __STATE __COUNTY __LOCAL

DEPOSITORY FOR SURVEY RECORDS:

CITY, TOWN: — STATE:

7 DESCRIPTION

CONDITION		CHECK ONE	CHECK ONE
__EXCELLENT	__DETERIORATED	__UNALTERED	__ORIGINAL SITE
XXGOOD	__RUINS	XXALTERED	__MOVED DATE_____
__FAIR	__UNEXPOSED		

DESCRIBE THE PRESENT AND ORIGINAL (IF KNOWN) PHYSICAL APPEARANCE

Pompeys Pillar is located on the south bank of the Yellowstone River, in Yellowstone County, Montana, about one mile north of U.S. 10, one mile east of Nibbe in south central Montana. As viewed from the west and south, the vertical stone face of the pillar juts abruptly above the level floor of the valley, which measures more than a mile across at this point. From its top both the Beartooth and Big Horn Mountains can be seen. Contrary to most written descriptions, the overall height of the pillar, including a thick cap of earth, is probably not more than 120 feet above its base.

The northeast side of the rock gradually slopes downward to ground level. Diameter of the long axis running east and west is about 350 feet. A strip of land, 300 feet wide, separates the pillar from the river bank. The elevation of the adjacent valley floor is about 2800 feet above sea level.

Pompeys Pillar is composed of thick beds of fine-grained sandstone separated by narrower layers of sandstone breccia. The material probably corresponds to the Parkman sandstone formation laid down as marine sediment during the upper Cretaceous period more than 60 million years ago. At one time in the far distant geological past the pillar obviously was part of the same formation now exposed in the bluff only a few hundred yards north across the river. The action of the river probably eroded through a protruding headland and effectively isolated the tip which is seen today as the pillar.

Evidence of Indian occupation was obvious both to Clark and later travelers who reported the presence of pictographs inscribed on the rock. Although the Indian carvings are barely noticeable today, and in only one place, a number of traditional stories about the pillar still circulate in the Crow tribe. The Crow were the principal occupants of the area during the 1800's, with occasional visits by Gros Ventres, Blackfeet, and Assiniboine, and later the Sioux.

Stuart W. Conner, a Billings archeologist, studied and copied the petroglyphs recently (ca. 1970). They are located just southeast of the Clark signature and can only be faintly distinguished as red markings on the rock as the area is also covered with hundreds of more recent carved signatures. One pictograph is the figure of an animal with an arrow in its back, and there is also a series of stick figures, apparently scratched into the rock through a coating of red stain (believed to be Shoshone, A.D. 1200-1800).

Clark's signature is on the face of an overhanging wall of rock, just below the top and on the east end and riverside of the pillar, about seven feet above a short path running along the base of the wall. The signature can be plainly seen through the glass-fronted bronze case, and all around it, for at

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(Rev. 10-74)

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

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Pompeys Pillar

CONTINUATION SHEET ITEM NUMBER 7 PAGE 1

least 15 feet, are hundreds of initials, names and dates carved into the flat stone area. Most of the older inscriptions date around the turn of the century, although one 1875 date is still prominent.

The Northern Pacific Railway Company acquired a 400 foot right-of-way through this area in 1882, located about a half mile south of Pompeys Pillar, which would be plainly seen from passing trains. The railroad seemed to take a protective interest in the landmark and had a heavy iron grate made and sunk firmly into the rock to protect Clark's signature. Although this grate provided partial protection against vandals, the eroding action of the wind and weather continued to dim the signature.

In 1926, at the instigation of the local DAR group, the railroad authorized the Billings Marble and Granite Works to cut the letter deeper into the stone. There is a possibility that the inscription may have been cut more deeply by a member of the Josephine crew in 1875 also. In 1928 the Billings chapter of the DAR erected a bronze plaque commemorating Lewis and Clark, in 1938 the Masons placed another plaque honoring both explorers as Masons, and in 1968 a plaque commemorating the efforts of Don Foote in the preservation of Pompeys Pillar, was placed there. All three of these bronze plaques are affixed to the face of the cliff within a few feet and east of the Clark inscriptions, and on the same flat surface as other carvings and the petroglyphs. The national historic landmark plaque is mounted on a large rock at the base of the pillar.

Pompeys Pillar and 105 surrounding acres were purchased in 1956 by the Foote family of Billings, who presently own it, and extensive plans were made to develop the site as a privately operated historical area then called "Pompeys Pillar Monument Park." Trails up the north side of the pillar were graded, steps and railings were installed to assist the climber. Interpretive markers were erected and a road was built from the highway to the river bank and then around the base of the pillar itself. The Clark signature was encased in a bronze casement sunk into the rock, with inch-thick shatterproof glass protecting the carving.

The Footes planned a rather large-scale development of the site including a Western frontier town and possibly a museum to house the family's extensive collection of western Americana. They moved three old buildings to the area including a turn-of-the century country store from Nibbe, Montana, a log structure from the Billings suburb of Lockwood, and a homesteader's cabin from Livingston. These buildings, plus a fourth structure intended for a livery stable and now used for a ticket booth, and a mobile home used by

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Pompeys Pillar

CONTINUATION SHEET ITEM NUMBER 7 PAGE 2

the owners, are all located in a wooded area just east of the pillar. They are non-historic and do not contribute to the national significance of the site. Plans for the frontier town have been curtailed, but the area has been improved for recreational use and paths have been cleared through the cottonwood trees which line the river bank. An unpaved parking area has been made just northeast of the pillar, and picnicking facilities have been installed.

A number of miscellaneous objects associated with western history, though not necessarily with Pompeys Pillar, are displayed around the base of the rock formation, including a number of old wagons which line the road south of the pillar, a display of petrified wood, a case of Indian relics and a dugout canoe built by a local group. Since the original purchase of 105 acres, the Foote family has purchased approximately 80 more acres of adjacent property, which is used for farming and cattle raising, managed by a tenant whose house and farm buildings are located to the south, nearer route 312.

Much of the data from special NPS study by Andrew M. Loveless, 1965.

8 SIGNIFICANCE

PERIOD	AREAS OF SIGNIFICANCE -- CHECK AND JUSTIFY BELOW			
__PREHISTORIC	XXARCHEOLOGY-PREHISTORIC	__COMMUNITY PLANNING	__LANDSCAPE ARCHITECTURE	__RELIGION
__1400-1499	__ARCHEOLOGY-HISTORIC	__CONSERVATION	__LAW	__SCIENCE
__1500-1599	__AGRICULTURE	__ECONOMICS	__LITERATURE	__SCULPTURE
__1600-1699	__ARCHITECTURE	__EDUCATION	__MILITARY	__SOCIAL/HUMANITARIAN
__1700-1799	__ART	__ENGINEERING	__MUSIC	__THEATER
XX1800-1899	__COMMERCE	XXEXPLORATION/SETTLEMENT	__PHILOSOPHY	__TRANSPORTATION
__1900-	__COMMUNICATIONS	__INDUSTRY	__POLITICS/GOVERNMENT	__OTHER (SPECIFY)
		__INVENTION		

SPECIFIC DATES July 25, 1806 **BUILDER/ARCHITECT**

STATEMENT OF SIGNIFICANCE

Pompeys Pillar is an isolated block of light-yellow sandstone that abruptly rises more than 100 feet above the level plain and south bank of the Yellowstone River, near Nibbe, Montana. On its upper east surface is carved "Wm Clark July 25, 1806", probably the only extant physical evidence of the entire Lewis and Clark expedition.

The pillar's primary historic significance is its association with the Lewis and Clark expedition of 1804-1806. However, it was evidently used by the Indians as a signal tower, and the walls bear Indian petroglyphs, which were noted by Clark in his journal. Also noted by Clark was the location of the rock tower near the intersection of the 46th parallel and the 108th meredian, which made the pillar a natural landmark for many later expeditions and surveys.

It was while on a side trip during the expedition's return east in 1806, following the Yellowstone River easterly, that explorer William Clark's party, which included Sacajawea and her child, noticed the prominent rock formation, which from that direction does resemble a tower. Clark recorded that he climbed the tower, carved his name and date on its surface, and named the rock formation for Sacajawea's infant son.

On their return from the Pacific, William Clark and Meriwether Lewis had divided the expedition, at Travellers Rest to explore various routes, and Clark and his men set out for the caches on Beaverhead. From there they proceeded down the river to Three Forks, and at that point the party again subdivided. Clark and his group crossed over Bozeman Pass to the Yellowstone and descended that stream.

Clark described the visit to the sandstone tower as follows:

> ...at 4PM arrived at the remarkable rock situated in an extensive bottom on the Stard. Side of the river and 250 paces from it. thick rock I ascended and from it's top had a most extensive view in every direction. This rock which I shall call Pompy's Tower is 200 feet high and 400 paces in secumpherance and only axcessible on one Side which is from the N.E. the other parts of it being a perpendicular clift of lightish coloured gritty rock...The natives have ingraved on the face

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Pompeys Pillar

CONTINUATION SHEET ITEM NUMBER 8 PAGE 1

of this rock the figures of animals &c. near which I marked my name and the day of the month & year....

After reviewing the countryside and noting the "emence" herds of buffalo and elk nearby, Clark took the last look he would ever have of the Rockies and returned to the canoes. Continuing downriver, the party rejoined Meriwether Lewis, and the expedition reached St. Louis September 23, 1806.

Most later expeditions and surveys through southern Montana either passed by or terminated at Pompeys Pillar. In 1860, members of an exploration party climbed to its summit in order to observe scientifically a solar eclipse. The survey for the line of the Northern Pacific Railroad was completed near the pillar in 1873 and here George A. Custer, an officer in the accompanying military escort, arrived at the point farthest west he would ever reach.

A mining party under James Stuart in Spring 1863 noticed not only Clark's inscription, but the names of two of his men as well. A number of these early reports described the large numbers of wildlife, particularly buffalo also noted by Clark near the site. On June 3, 1875 an exploratory expedition along the Yellowstone river with several Smithsonian professors and a military escort reached Pompeys Pillar on board the Josephine, and the captain carved the name of the ship and the date on the pillar and flew the Stars and Stripes from the top of the rock tower. The next year a force of about 450 men under Colonel John Gibbon camped near the site and inscribed their names in the rock, and several noted Clark's signature in their journals.

No writer has ever seriously challenged the authenticity of the Clark signature; and on the basis of the known records and present condition of the carving, it appears most probable that the inscription is Clark's. It would be most unlikely that an early nineteenth century visitor could perpetrate such a hoax.

The name "Pomp" was the nickname Clark gave to Sacajawea's infant son, Baptiste Charboneau, according to a 1806 letter of Clark's. Nicholas Biddle, one of the later editors of the Lewis and Clark journals has been accused of substituting the name of a Roman column for Clark's simple name "Pompy's Tower".

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Pompeys Pillar

CONTINUATION SHEET ITEM NUMBER 9 PAGE 1

Reuben G. Thwaites, The Original Journals of Lewis and Clark (New York, 1905).

James Stuart, "The Yellowstone Expedition of 1863," Contributions to the Historical Society of Montana (Helena, 1902).

Joseph M. Hanson, The Conquest of the Missouri (New York, 1946).

Lt. James H. Bradley, The March of the Montana Column (Norman, 1961).

Andrew M. Loveless, "Report on the Historical Investigation of Pompeys Pillar, Yellowstone County, Montana," National Park Service report: February 1965.

Robert G. Ferris, editor, Lewis and Clark: Historic Places Associated with Their Transcontinental Exploration, (1804-1806) (Washington, D.C.: National Park Service, 1975).

FHR-8-250A (10/78)

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CONTINUATION SHEET **ITEM NUMBER** 10 **PAGE** 1

This boundary is marked by the contour line 2890 on the USGS 7.5 minute map, Nibbe, Montana, where the butte rises from the nearly level surrounding terrace. This boundary is marked by a dirt road on the southeast and extends to the dirt road on the west at one spot. The boundary does not include the roads. No more area is included because there have been certain developments (discussed earlier) in the tree grove around the pillar. These tourist trade improvements, while they do not detract from Pompeys Pillar, are not associated with the significance of the National Landmark, and therefore have been excluded from the Landmark boundaries.

11 1

Andrew M. Loveless 1965.

Ray H. Mattison 1958

Ann M. Johnson 1982

Rocky Mountain Regional Office
National Park Service
P.O.Box 25287
Denver, Co. 80225

GPO 936-009

9 MAJOR BIBLIOGRAPHICAL REFERENCES

see continuation sheet

10 GEOGRAPHICAL DATA

ACREAGE OF NOMINATED PROPERTY 6 acres

UTM REFERENCES

	ZONE	EASTING	NORTHING
A	12	732040	5097720
B	12	731928	5097640
C	12	731928	5097720
D	12	731920	5097760

VERBAL BOUNDARY DESCRIPTION

see continuation sheet

LIST ALL STATES AND COUNTIES FOR PROPERTIES OVERLAPPING STATE OR COUNTY BOUNDARIES

STATE	CODE	COUNTY	CODE
STATE	CODE	COUNTY	CODE

11 FORM PREPARED BY

NAME / TITLE

Blanche Higgins, Landmark Review Project — 6/15/76

ORGANIZATION — DATE

Historic Sites Survey, National Park Service

STREET & NUMBER — TELEPHONE

CITY OR TOWN — STATE

Washington — D.C.

12 STATE HISTORIC PRESERVATION OFFICER CERTIFICATION

THE EVALUATED SIGNIFICANCE OF THIS PROPERTY WITHIN THE STATE IS:

NATIONAL ___ STATE ___ LOCAL ___

As the designated State Historic Preservation Officer for the National Historic Preservation Act of 1966 (Public Law 89-665), I hereby nominate this property for inclusion in the National Register and certify that it has been evaluated according to the criteria and procedures set forth by the National Park Service.

STATE HISTORIC PRESERVATION OFFICER SIGNATURE

TITLE — DATE

FOR NPS USE ONLY

I HEREBY CERTIFY THAT THIS PROPERTY IS INCLUDED IN THE NATIONAL REGISTER

DATE 9/27/83

ATTEST: — DATE

KEEPER OF THE NATIONAL REGISTER

Pompeys Pillar National Historic Landmark Designation

February 25, 1965

Form 10-317
(Sept. 1957)

UNITED STATES
DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

NATIONAL SURVEY OF HISTORIC SITES AND BUILDINGS

1. STATE	2. THEME(S). IF ARCHEOLOGICAL SITE, WRITE "ARCH" BEFORE THEME NO.
Montana	XI - The Advance of the Frontier, 1763-1830

3. NAME(S) OF SITE	4. APPROX. ACREAGE
Pompeys Pillar	185 acres

5. EXACT LOCATION (*County, township, roads, etc. If difficult to find, sketch on Supplementary Sheet*)
Yellowstone County, 33 miles northeast of Billings and 1/2 mile north of US 10.

6. NAME AND ADDRESS OF PRESENT OWNER (*Also administrator if different from owner*)
Mr. Don C. Foote, 1207 Hillhaven Way, Billings, Montana

7. IMPORTANCE AND DESCRIPTION (*Describe briefly what makes site important and what remains are extant*)

Pompeys Pillar is an isolated block of light-yellow sandstone that abruptly rises 120 feet above the floor of the Yellowstone Valley. It measures some 350 feet across at its widest point and is located just south of the Yellowstone River. On its upper east surface, protected by a glass-fronted bronze case, is carved "Wm Clark July 25 1806."

The pillar's primary historical significance is centered on its association with the Lewis and Clark Expedition of 1804-06. It also represented a notable landmark for later expeditions and surveys along the Yellowstone River.

While on a side trip during the return east in 1806, explorer William Clark noted in his journal the discovery of a prominent tower of rock near the Yellowstone which he named for Sacajawea's infant son. He described climbing the rock and carving his name and the date on its surface. The location of the pillar, near the intersection of the 46th parallel and the 108th meridian, was recorded by Clark, and his account was eventually published along with the edited journals of the expedition.

Most later expeditions and surveys through southern Montana either passed by or terminated at Pompeys Pillar. In 1860, members of an exploration party climbed to its summit in order to observe scientifically a solar eclipse. The survey for the line of the Northern Pacific Railroad was completed near the pillar in 1873 and here George A. Custer, an officer in the accompanying military escort, arrived at the point

8. BIBLIOGRAPHICAL REFERENCES (*Give best sources; give location of manuscripts and rare works*)
Reuben G. Thwaites, The Original Journals of Lewis and Clark (New York, 1904-05).
James Stuart, "The Yellowstone Expedition of 1863," Contributions to the Historical Society of Montana (Helena, 1902).
Joseph M. Hanson, The Conquest of the Missouri (New York, 1946).
Lt. James H. Bradley, The March of the Montana Column (Norman, 1961).

9. REPORTS AND STUDIES (*Mention best reports and studies, as, NPS study, HABS, etc.*)
Historic Site Study of February, 1965, by Andrew M. Loveless, Historian, Custer Battlefield

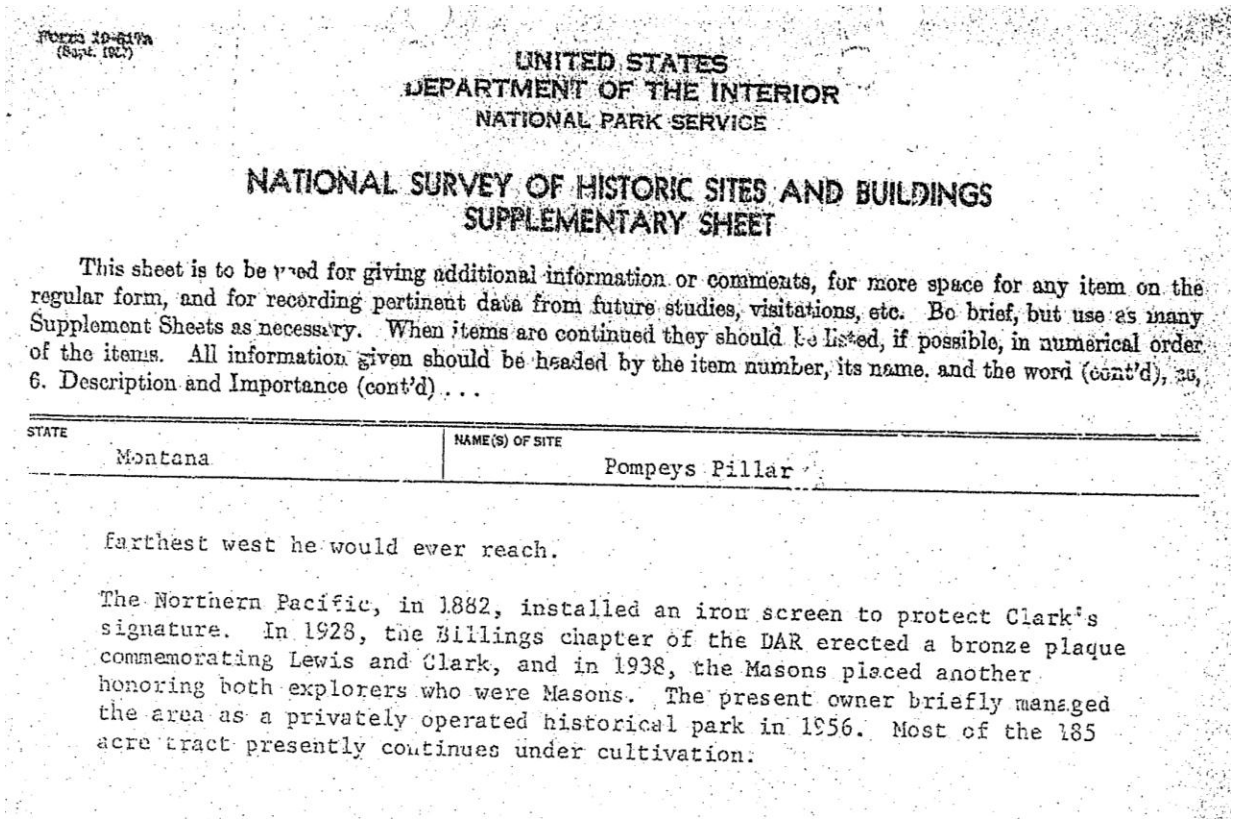
10. PHOTOGRAPHS * ATTACHED: YES ☒ NO ☐	11. CONDITION	12. PRESENT USE (*Museum, farm, etc.*)	13. DATE OF VISIT
	Excellent	Farm	February 18, 1965

14. NAME OF RECORDER (*Signature*)	15. TITLE	16. DATE
Andrew M. Loveless *Andrew M. Loveless*	Historian	February 23, 1965

* DRY MOUNT ON AN 8 X 10½ SHEET OF FAIRLY HEAVY PAPER. IDENTIFY BY VIEW AND NAME OF THE SITE, DATE OF PHOTOGRAPH, AND NAME OF PHOTOGRAPHER. GIVE LOCATION OF NEGATIVE. IF ATTACHED, ENCLOSE IN PROPER NEGATIVE ENVELOPES.

(IF ADDITIONAL SPACE IS NEEDED USE SUPPLEMENTARY SHEET, 10-317a, AND REFER TO ITEM NUMBER)

U. S. GOVERNMENT PRINTING OFFICE 13—75016-1



Form 10-61Ma
(Sept. 1965)

UNITED STATES
DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

NATIONAL SURVEY OF HISTORIC SITES AND BUILDINGS
SUPPLEMENTARY SHEET

This sheet is to be used for giving additional information or comments, for more space for any item on the regular form, and for recording pertinent data from future studies, visitations, etc. Be brief, but use as many Supplement Sheets as necessary. When items are continued they should be listed, if possible, in numerical order of the items. All information given should be headed by the item number, its name, and the word (cont'd), as, 6. Description and Importance (cont'd) . . .

STATE	NAME(S) OF SITE
Montana	Pompeys Pillar

farthest west he would ever reach.

The Northern Pacific, in 1882, installed an iron screen to protect Clark's signature. In 1928, the Billings chapter of the DAR erected a bronze plaque commemorating Lewis and Clark, and in 1938, the Masons placed another honoring both explorers who were Masons. The present owner briefly managed the area as a privately operated historical park in 1956. Most of the 185 acre tract presently continues under cultivation.

Notes:
The 1965 "National Survey of Historic Sites and Buildings" survey form was the documentation for the designation of Pompeys Pillar as a National Historic Landmark (NHL). These short forms, which were generally 1-2 pages in length, served as the NHL documentation forms in these early days of the NHL Program. Years later, after the National Park Service developed actual National Register nomination forms, then those forms were used to create updated documentation forms for NHLs. The 1983 National Register nomination form is the most updated NHL nomination form for Pompeys Pillar.

National Historic Landmark status is different than National Monument status. It wasn't until 2001 that Pompeys Pillar was declared a National Monument by President Bill Clinton. The authority for that designation was through the Antiquities Act (Section 2), which authorizes the President to make national monuments out of sites that are "historic landmarks, historic and prehistoric structures, and other objects of historic or scientific interest" on land that is already managed by the federal government.

Appendix X:
Implementation and Monitoring

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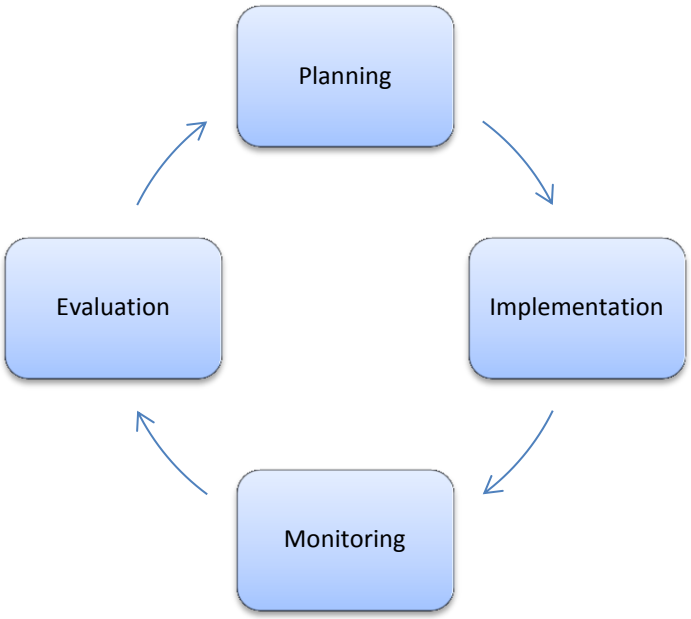
X. Implementation and Monitoring

Plan implementation is a continuous process occurring over the life of the resource management plan that will consider changing circumstances and new information through monitoring. The goal is to maintain a dynamic resource management plan that is evaluated and amended if necessary on an issue-by-issue basis.

The implementation and monitoring process for the Billings Field Office and Pompeys Pillar National Monument (NM) involves four major steps: planning, implementation, monitoring, evaluation, and adjustments, as necessary. Planning involves a great amount of time and resources to identify issues and management opportunities to address those issues. During the planning process, the scope of the issue is identified and management goals, objectives and actions are defined to address the issues. Once the planning process is completed, decisions are implemented, monitored, and evaluated over a period of time to determine if goals are being met and if management actions are achieving the desired objective or standard. Results of monitoring are documented and communicated to appropriate parties, and management objectives and actions are modified based on results, if necessary.



Planning

The Proposed Resource Management Plan (RMP) and Final Environmental Impact Statement (EIS) is approved once the Record of Decision (ROD) is signed. An Approved Plan will also be available that will include all the approved decisions from the RMP.

The BLM regulation in 43 CFR 1610.5-4 provides that land use plan decisions and supporting components can be maintained to reflect minor changes in data. Maintenance is limited to further refining, documenting, or clarifying a previously approved decision incorporated in the

plan. Maintenance must not expand the scope of resource uses or restrictions or change the terms, conditions, and decisions of the Approved Plan.

Land use plan decisions are changed through either a plan amendment or a plan revision. The process for conducting plan amendments is essentially the same as the land use planning process used in developing RMPs. The primary difference is that circumstances may allow for completing a plan amendment through the environmental assessment (EA) process, rather than through an EIS. Plan amendments (43 CFR 1610.5-5) change one or more of the terms, conditions, or decisions of an approved land use plan. Plan amendments are most often prompted by the need to consider a proposal or action that does not conform to the plan; implement new or revised policy that changes land use plan decisions; respond to new, intensified, or changed uses on BLM land; and consider significant new information from resource assessments, monitoring, or scientific studies that change land use plan decisions.

Implementation

Implementation of the resource management plan (RMP) begins once the Record of Decision and Approved Plan for the Proposed RMP/Final EIS is signed.

Decisions made through the RMP planning process are implemented over a period of time. Some of the decisions are immediate and go into effect with the Record of Decision. These include decisions such as the road designations and lands available for disposal through exchange. Some decisions would be implemented after a site-specific environmental review is completed. Examples include range improvements, recreation sites, or approval of an application for permit to drill a natural gas well. Other decisions include guidance that would be applied during site-specific analysis or activity planning.

Any future proposals or management actions will be reviewed against the Approved Plan to determine if the proposal would be in conformance with the RMP. While the Final EIS for the Billings and Pompeys Pillar NM RMP provides the compliance with NEPA for the broad-scale decisions to be made in the Record of Decision, it does not replace the requirement to comply with NEPA for implementation actions. Proposed actions fall into one of five categories: (1) actions that are exempt from NEPA; (2) actions that are categorically excluded; (3) actions that are covered by an existing NEPA environmental document; (4) actions that require preparation of an environmental assessment (EA) to determine if an environmental impact statement (EIS) is needed; or (5) actions that require preparation of an EIS. The NEPA procedural, documentation, and public involvement requirements are different for each category.

Activity level planning will address any proposed new activities and long-term permitted activities that need to be brought into compliance with plan decisions, subject to valid existing rights. Monitoring of these activities will then determine the effectiveness of applying the land use plan direction. Where land use plan actions or best management practices are not effective, modifications could occur without amendment or revision of the plan as long as assumptions and impacts disclosed in the analysis remain valid and broad-scale goals and objectives are not changed. This approach uses on-the-ground monitoring, review of scientific information, and consideration of practical experience and common sense to adjust management and modify implementation of the plan to reach the desired outcome.

As part of this process, the BLM will review management actions and the plan periodically to determine whether the objectives set forth in this document are being met. Where they are not being met, the BLM will consider adjustments of appropriate scope. Where the BLM considers taking or approving actions which will alter or not conform to overall direction of the plan, the BLM will prepare a plan amendment and environmental analysis of appropriate scope.

In addition, during the life of the Approved Plan, the BLM expects that new information gathered from field inventories and assessments, research, other agency studies, and other sources will update baseline data or support new management techniques, best management practices, and scientific principles. To the extent that such new information or actions address issues covered in the plan, the BLM will integrate the data through plan maintenance.

Monitoring

Monitoring is the repeated measurement of activities and conditions over time. Monitoring data gathered over time is examined and used to draw conclusions on whether management actions are meeting stated objectives, and if not, why. Conclusions are then used to make recommendations on whether to continue current management or what changes need to be made in management practices to meet objectives.

Monitoring determines whether planned activities have been implemented in the manner prescribed by the plan. This monitoring documents BLM's progress toward full implementation of the land use plan decision. There are no specific thresholds or indicators required for this type of monitoring.

Monitoring also is used to determine if the implementation of activities has achieved the desired goals and objectives. This requires knowledge of the objectives established in the RMP as well as indicators that can be measured. Indicators are established by technical specialists in order to address specific questions, and thus avoid collection of unnecessary data. Success is measured against the benchmark of achieving desired future conditions established by the plan.

Monitoring is also used to ascertain whether a cause-and-effect relationship exists among management activities or resources being managed. It confirms whether the predicted results occurred and if assumptions and models used to develop the plan are correct. This type of monitoring is often done by contract with another agency, academic institution, or other entity, and is usually expensive and time consuming since results are not known for many years.

Regulations at 43 CFR 1610.4-9 require that the proposed plan establish intervals and standards, as appropriate, for monitoring and evaluation of the plan, based on the sensitivity of the resource decisions involved. Progress in meeting the plan objectives and adherence to the management framework established by the plan is reviewed periodically. CEQ regulations implementing NEPA state that agencies may provide for monitoring to assure that their decisions are carried out and should do so in important cases (40 CFR 1505.2(c)). To meet these requirements, the BLM will prepare periodic reports on the implementation of the RMP.

Evaluation

Evaluation is a process in which the plan and monitoring data are reviewed to see if management goals and objectives are being met and if management direction is sound.

Land use plan evaluations will be used by BLM to determine if the decisions in the RMP, supported by the accompanying NEPA analysis, are still valid. Evaluation of the RMP will generally be conducted every five years, unless unexpected actions, new information, or significant changes in other plans, legislation, or litigation triggers an evaluation. Land use plan evaluations determine if decisions are being implemented, whether mitigation measures are satisfactory, whether there are significant changes in the related plans of other entities, whether there is new data of significance to the plan, and if decisions should be changed through amendment or revision.

Based on a Record of Decision and Approved Plan released in the spring of 2014, the following evaluation schedule would be followed for the Billings and Pompeys Pillar National Monument RMP/EIS:

Fall 2019

Fall 2024

Fall 2029

Fall 2034

Evaluations will follow the protocols established by the BLM Land Use Planning Handbook H-1601-1 in effect at the time the evaluation is initiated.

INTRODUCTION

For each resource, there are a series of items that will be monitored. Each item is evaluated by location, technique for data gathering, unit of measure, frequency, remedial action trigger, and management option (Table 1). The monitoring and evaluation plan states the event that will be evaluated and lists the key resources that will be managed in the planning area. If an adverse impact can be corrected by a management action within the scope of this plan, the change will be implemented. If the adverse impact can be corrected only by a management action that is outside the scope of this plan, the management change will be a formal amendment.

TABLE 1. MONITORING TABLE

Element	Item	Location	Technique	Unit of Measure	Frequency and Duration	Remedial Action Trigger	Management Options
AIR RESOURCES AND CLIMATE							
Air Resources and Climate	Gaseous and particulate regulated air pollutants and air quality related values (AQRVs), such as acid deposition, lake acidification, and visibility	Area-wide	Air quality photochemical grid modeling	Micrograms/cubic meter (µg/m$^{3)}$ and parts per million (ppm) concentrations (as µg/m^3)	Modeling will be performed when adequate data are available to validate model performance (see the *Air Resources and Climate Appendix*)	Predicted exceedances of National Ambient Air Quality Standards (NAAQS) or Montana Ambient Air Quality Standards (MAAQS) or unacceptable impacts to AQRVs	Implement additional emission controls or operating limits
	Gaseous and particulate regulated air pollutants	Area-wide	Continued automated sampling and analysis	µg/m^3 and ppm concentrations (as µg/m^3)	Continuous	Measured exceedances of NAAQS or MAAQS	Implement additional emission controls or operating limits
	Climate indicators including temperature, precipitation, precipitation timing and intensity, snowfall, snow pack, albedo, greenhouse gas	Area-wide	Analysis of existing climatic data and climate change data available from the National Oceanic and Atmospheric Administration, the Western	Degrees Fahrenheit (°F), degrees Celsius (°C), inches, feet, unitless (albedo), ppm, parts per billion	Annual	None (actions triggered based on resource-specific concerns)	Provide annual updates summarizing recent climate trends to Bureau of Land Management (BLM) resource management

Element	Item	Location	Technique	Unit of Measure	Frequency and Duration	Remedial Action Trigger	Management Options
	(GHG) concentrations		Regional Climate Center, United States Environmental Protection Agency (USEPA), and other reliable sources of information				personnel
SOILS							
Soils	Soil erosion, uplands	Area-wide where management activities are occurring or expected to occur	Visual observation, photo point, rangeland health assessment, surface aggregate stability test, silt fence, and surveyed erosion pins	Soil loss in tons per acre	Site will be visually examined quarterly. Where erosion is considered excessive, measurements of site characteristics will be taken to determine rate of soil loss.	Visual evidence of pedestal, wind scour, rill greater than 3 inches, active headcutting gully, or sheet erosion. Soil or site stability indicators are not similar to reference rangeland health conditions. Change in surface aggregate stability to a lower class. Loss of soil exceeding 10	Report exceedance to the BLM, Montana Department of Environmental Quality (MDEQ), or USEPA. Enforcement action would be taken.

Element	Item	Location	Technique	Unit of Measure	Frequency and Duration	Remedial Action Trigger	Management Options
						tons per acre per year	
Soils (cont'd)	Soil erosion, streambanks, riparian areas, and floodplains	Area-wide along rivers and tributaries where management activities are occurring or expected to occur	Visual observation, photo point, rangeland health or proper functioning condition assessments, silt fence, and surveyed erosion pins	Area affected in square feet or acres	Site would be visually examined quarterly. Where streambank erosion is considered excessive, measurements of site characteristics will be taken to determine soil loss.	Visual evidence of active headcutting, channelization beyond natural conditions, or bank slump. Proper functioning condition (PFC) rated functional-at-risk with a downward trend or nonfunctional. A 10% increase in streambank loss.	Report exceedance to the BLM, MDEQ, or USEPA. Enforcement action would be taken.
	Soil salinization and sodification	Area-wide where management activities were occurring or expected to occur	Visual observation, measurement of soil characteristics such as (electrical conductivity (EC), sodium adsorption ratio (SAR),	Area affected in square feet or acres	Site would be visually examined quarterly. Where impacts to soil or vegetation were observed, measurements of site	A 20% increase in levels in EC, SAR, or exchange sodium percentage (EC greater than 8, SAR greater than 8, exchangeable	Report exceedance to the BLM, MDEQ, or USEPA. Enforcement action would be taken.

Element	Item	Location	Technique	Unit of Measure	Frequency and Duration	Remedial Action Trigger	Management Options
			exchange sodium percentage, and pH		characteristics would be taken to determine salinity and sodicity levels.	sodium percentage greater than 10, or pH greater than 8.5)	
Soils (cont'd)	Compaction	Area-wide where management activities were occurring or expected to occur	Visual inspection, penetrometer, or ratio of penetration resistance or bulk density to that of the reference area	Lbs. per square inch, mass per volume	Site would be visually examined 1 to 2 times yearly; where compaction is considered excessive, measurements would be taken.	When an area has a 10% increase in density or ratio of penetration resistance or bulk density to that of the reference area greater than 1 and the compacted area exceeds 10% of surface disturbance	Decompact or close access to compacted site until area recovers from compaction
	Rutting	Area-wide where management activities were occurring or expected to occur	Visual observation and measured depth of rut	Inches	Site would be visually examined 1 to 2 times yearly. Where rutting is considered excessive, measurements would be taken.	Ruts exceed 4 inches in depth	Close access to rutted site until soil conditions are not susceptible to rutting and are repaired.

Element	Item	Location	Technique	Unit of Measure	Frequency and Duration	Remedial Action Trigger	Management Options
Soils (cont'd)	Subsidence of fill material	Areas where management activities required fill material	Visual observation and measured depth of subsidence	Feet	Site would be visually examined 1 to 2 times yearly. Where slumping or piping is considered excessive, measurements would be taken.	10% increase in slumping or piping depth	Close access to site until area is reclaimed
WATER							
Water	Surface water quality and quantity	In watersheds expected to be affected, potentially affected, or down gradient from CBNG surface discharge points or regionally at the monitoring stations identified by the interagency working group (refer to *Final Supplement to the Montana Statewide Oil and Gas Environmental Impact*	As determined by the interagency working group (refer to the FSEIS) or water quality parameters, temperature, and discharge or stage measurements	As determined by the interagency working group (refer to the FSEIS) or feet, cubic feet per second (cfs), and standard quantitative measurements of water quality (e.g., milligrams per liter [mg/L], pH, µS/cm, and °C)	As determined by the interagency working group or based on activity plan schedule (refer to the FSEIS)	Exceedance of any parameter above the State of Montana surface water quality standards or identified BLM thresholds (refer to the FSEIS)	Report exceedances to the MDEQ, which would determine cause and take appropriate actions if monitoring indicates that BLM thresholds were met or exceeded, Untreated discharge of CBNG water from federal wells would no longer be allowed upstream from that station.

Element	Item	Location	Technique	Unit of Measure	Frequency and Duration	Remedial Action Trigger	Management Options
		Statement and Proposed Amendment of the Powder River and Billings Resource Management Plans [FSEIS]). Note that the 10% of 7Q10 criteria for untreated CBNG water would apply unless stations upstream and downstream from proposed outfalls are monitored (refer to the FSEIS).					Previous approvals may be modified.
Water (cont'd)	Groundwater drawdown	Regionally at locations determined by the interagency working group (refer to the FSEIS)	Monitoring wells would be finished in bedrock units; especially coal seams expected to be developed for CBNG.	Depth to water reported in hundredths of feet	Depth to water measurements would be made approximately monthly to establish an initial baseline. Measurements would be	A 20-foot decrease in static water level from seasonally adjusted mean static water level (determined from baseline data) (refer to	If falling water levels were determined to be caused by CBNG activity, operators must offer water well mitigation agreements to all landowners

Element	Item	Location	Technique	Unit of Measure	Frequency and Duration	Remedial Action Trigger	Management Options
					made approximately quarterly thereafter unless a greater frequency was determined to be necessary. Monitoring would continue until at least 80% recovery of static water level was achieved.	the FSEIS)	with water sources in the defined drawdown area (20 feet or greater drawdown) of their development. Hydrologic barriers, such as injection wells, may be an option in some cases to prevent drainage of American Indian gas and water resources.
Water (cont'd)	Groundwater quality and quantity	Alluvial groundwater would be monitored in stream valleys topographically down gradient from CBNG surface discharge points. Since discharge to ephemeral streams would not be allowed,	Monitoring wells would be finished in the alluvium. Depth to water measurements and water quality parameters, including (but not limited to) pH, EC, water temperature, common ions (Na, Mg, Ca,	Standard quantitative measurements of water quality and static water level (mg/L, °C, µS/cm, and hundredths of feet)	Depth to water measurements would be made approximately monthly to establish an initial baseline. Depth to water would then be collected approximately quarterly thereafter.	A change in groundwater chemistry that affects its class of use or rise in static groundwater levels of 5 feet or more that may cause impacts at the ground surface (refer to the FSEIS)	If impacts were determined to result from CBNG development, direct discharge of CBNG water into waterways in the watershed may be discontinued until modified

Element	Item	Location	Technique	Unit of Measure	Frequency and Duration	Remedial Action Trigger	Management Options
		these wells would be along larger streams (refer to the FSEIS).	K, HCO_3, CI, SO_4) would be obtained.		Water quality samples would be taken approximately annually unless more frequent monitoring is needed. Monitoring would continue until at least 80% recovery of static water level was achieved.		water management plans were submitted and approved (refer to the FSEIS).
Water (cont'd)	Groundwater quality and quantity	Operators would install monitoring wells adjacent to impoundments (refer to the FSEIS).	A monitoring well would be installed within the first permeable unit and within the first groundwater encountered (up to 50 feet total depth) to determine effectiveness of infiltration; if evaporation basins were leaking, a water quality sample of the	Depth to water (feet to water reported in hundredths of feet). Water quality samples would be collected if rises in groundwater were observed or if water were observed in a previously dry zone.	Wells would be gauged monthly for the first year and quarterly thereafter unless a rise was observed. If a rise were observed, monitoring would be monthly. Water quality samples would be collected whenever the water level is above	A rise of 1 foot or more in static water levels above seasonally adjusted mean water levels (determined from the first year of data) or a change in the class of use in the groundwater (refer to the FSEIS).	Any change in class of use would be reported to the MDEQ. Operators may be required to install additional monitoring wells further downgradient, or discharge into impoundments may be required to cease until a revised water

Element	Item	Location	Technique	Unit of Measure	Frequency and Duration	Remedial Action Trigger	Management Options
			first groundwater (if encountered) would be collected to determine class of use.		baseline. Monitoring would continue at least until the end of CBNG water discharge into the impoundment.		management plan is submitted and approved (refer to the FSEIS)
Water (cont'd)	Springs	A network of springs determined to be fed by the regional flow system would be identified along coal outcrops in the CBNG development area (refer to the FSEIS)	Spring discharge and water quality parameters, including (but not limited to) pH, EC, water temperature, and common ions (Na, Mg, Ca, K, HCO_3, CI, SO_4), would be determined from existing springs.	Discharge cubic feet per second (cfs), pH, EC (µS/cm), and water temperature (°C) would be determined in the field. Standard quantitative measurements of water quality also would be used (mg/L).	Field measurement of discharge, pH, EC, and water temperature would be determined approximately quarterly. An initial water quality sample would be collected; additional samples would be analyzed if substantial changes in the field parameters were observed.	A 50% decrease in spring discharge below seasonally adjusted mean (determined in the first 3 years) or a significant change in water quality that affects its beneficial use (refer to the FSEIS).	If decreased spring discharges or water quality were determined to result from CBNG activity, operators must offer spring mitigation agreements to landowners who use the spring. If the affected spring were identified as important wildlife habitat, adaptive management practices would be used at the

Element	Item	Location	Technique	Unit of Measure	Frequency and Duration	Remedial Action Trigger	Management Options
							landscape level to improve spring ecosystems. Hydrologic barriers, such as injection wells, may be an option in some cases to prevent drainage of American Indian gas and water resources (refer to the FSEIS).
Water (cont'd)	Streambank or channel alteration	Any federal area-wide action in which potential impacts from management activities are occurring or expected to occur	Monumented cross sections, longitudinal profile, visual inspection, photo point, PFC, surveyed erosion pins, and any suitable methods as described in *Grazing Management Processes and Strategies for Riparian-wetland Areas*	Area affected in square feet or acres	Based on activity plan schedule and a minimum of once every 10 years	Trend away from objective, a 10% increase in streambank or channel alteration, exceedance of any parameter above the State of Montana surface water quality standards for sediment, total	Activities would be required to be altered or discontinued in order to provide environmental factors for increasing functionality or conditions of the streams. Exceedance would be reported to BLM, MDEQ, or USEPA and

Element	Item	Location	Technique	Unit of Measure	Frequency and Duration	Remedial Action Trigger	Management Options
			(Wyman et al. 2006), *Bureau of Land Management Prairie Stream Surveys: Study Plan* (BLM 2010k), and *Stream Channel Reference Sites: An Illustrated Guide to Field Technique* (Harrelson, Rawlins, and Potyondy 1994).			suspended solids, or turbidity without a variance.	enforcement action would be taken.
Water (cont'd)	Surface water quality and quantity	Any federal area-wide action in which potential impacts from management activities are occurring or expected to occur	Water quality parameters, temperature, discharge, or stage measurements	Feet, cfs, or standard quantitative measurements of water quality (e.g., mg/L, pH, µS/cm, °C)	Based on activity plan schedule	Exceedance of any parameter above the State of Montana surface water quality standards	Activities would be required to be altered or discontinued. Exceedance would be reported to BLM, MDEQ, or USEPA and enforcement action would be taken.
Water, Indian trust	Groundwater	Adjacent to the Northern Cheyenne and	Sampling of dedicated monitoring	Standard quantitative measurements of	Field measurements six times	Where site-specific studies show a	The BLM would require the operators

Element	Item	Location	Technique	Unit of Measure	Frequency and Duration	Remedial Action Trigger	Management Options
		Crow Indian Reservations	wells in the zones of extraction and zones above and below the expected activity; wells are to be placed in the affected areas to areas unaffected by management activities	water quality and measurement of depth in feet	annually prior to production activities and continued throughout the activity period and for the duration of 95% of the recovery of pre-development conditions	potential to affect Reservation groundwater, the tribe would be consulted as to appropriate protection measures and where continuous monitoring showed a drawdown of groundwater attributed to CBNG production.	to modify federal CBNG production. Mitigation options would include reducing production rates, shutting in the well or wells, establishing a hydrologic barrier, or providing compensation to the affected tribe.
Water, Indian trust	Groundwater	Adjacent to the Northern Cheyenne and Crow Reservations	Monitoring wells would be established near the mouth of streams containing alluvium	Measurements of depth in feet	Water level measurements would be taken monthly prior to production activity and during development and water quality measurements would be taken 4 times per year	A 20% rise in the water table above its seasonally adjusted elevation, or a 2-unit increase in the SAR value	Discontinue CBNG evaporative ponds in that watershed or require ponds to be lined

Element	Item	Location	Technique	Unit of Measure	Frequency and Duration	Remedial Action Trigger	Management Options
VEGETATION							
Trees and shrubs	Functional habitat within desired conditions	Site-specific and landscape-level	Visual observation, photos, utilization, browse-evaluation, trend	Cover, diversity, and composition.	Varies and designed to address objectives	Failure to meet Rangeland Health Standards. Trend moving away from management objectives.	Change in livestock season-of-use, timing, intensity, frequency, and duration
Herbaceous	Functional habitat within desired conditions.	Site-specific and landscape-level	Utilization, visual observation, photos, and trend	Cover, diversity, and composition.	Varies and designed to address objectives	Failure to meet Rangeland Health Standards or trend moving away from management objectives	Change in livestock season-of-use, timing, intensity, frequency, and duration
Riparian and Wetland	Functional rating and trend	Priority allotments with allotment management plans and areas rated as non-functional or functional-at risk with downward trend	Lotic and lentic standard PFC checklist and multiple indicators monitoring techniques (see *Riparian Area Management, A User Guide to Assessing Proper Functioning Condition and the Supporting Science for*	Miles or acres based on functional rating and trend	Once every 5 to 10 years based on priority of non-functional and functional-at risk with downward trend areas	Trend away from objective or when no improvement occurs in areas rated as non-functional and functional-at risk with downward trend	Management changes would address causes of degradation. If impacts to management changes did not maintain or improve riparian and wetland functionality, additional monitoring or project revision would

Element	Item	Location	Technique	Unit of Measure	Frequency and Duration	Remedial Action Trigger	Management Options
			Lotic Areas, TR 1737-15 [Prichard 1998] and *Riparian Area Management A User Guide to Assessing Proper Functioning Condition and the Supporting Science for Lentic Areas*, TR 1737-16 [Prichard et al. 1999])				be required. Oil and gas operators would be required to alter activities in order to provide environmental factors for maintaining or improving functionality of riparian and wetland areas.
Noxious and Invasive Species	Infestations	Inventoried infestation	Photo points, geographic information systems (GIS) data, mapping, and National Invasive Species Information Management System	Infestation size, presence or absence	Annually or every 3 to 5 years and prioritized by species location and treatment method.	Expansion of weeds, Early Detection Rapid Response, new infestations in areas of high public use, and public accessible areas	Change in control method or combine multiple control methods and strategies
FISH AND WILDLIFE							
Fisheries and aquatic wildlife in prairie streams	Habitat conditions and index of biological integrity	All locations within Miles City Field Office (MCFO)	*Bureau of Land Management Prairie Stream Surveys: Study Plan* (BLM	300 meter stream study reaches	Every 5 years (all sites or streams) As needed: as	Decrease in index of biological integrity score, habitat	Management changes would address causes of degradation. If impacts to

Element	Item	Location	Technique	Unit of Measure	Frequency and Duration	Remedial Action Trigger	Management Options
		prairie stream survey protocol and locations as needed due to degraded habitat, allotment inspections, pre- and post-development, or as other needs arise	2010k) and index of biological integrity approach following *Development and evaluation of a fish assemblage index of biotic integrity for Northwestern Great Plains streams* (Bramblett, Johnson, Zale, and Heggem 2005) and *Fish and Habitat Sampling Protocol for Prairie Streams* (Bramblett 2003)		determined by a decrease in riparian conditions (e.g. declining PFC rating), water quality or water resource parameters indicate a decline in habitat conditions, or land-use or development plans indicate a potential for deleterious impacts to habitat	parameters, decreased riparian function, or allotment failing to meet Standards for Rangeland Health	management changes did not maintain or improve prairie stream aquatic wildlife habitat, additional monitoring or project revision would be required. Oil and gas operators would be required to alter activities in order to provide environmental factors for maintaining or improving prairie stream aquatic wildlife habitat.
Fisheries and aquatic wildlife in sport-fish reservoirs	Habitat conditions and surveys by Montana Fish, Wildlife, and Parks (MFWP)	Designated sport-fish reservoirs	Gill netting and trapping conducted by MFWP	Acres of reservoir	1 to 5 years or determined by MFWP	Decrease in population sizes due to factors related to resource use	Management changes would address causes of degradation. If impacts of management changes did not maintain or improve sport-

Element	Item	Location	Technique	Unit of Measure	Frequency and Duration	Remedial Action Trigger	Management Options
							fish reservoir habitat, additional monitoring or project revision would be required. Oil and gas operators would be required to alter activities to provide environmental factors for maintaining or improving sport-fish reservoir habitat.
Upland game birds and migratory bird species	Use and trend	Sharp-tailed and sage- grouse leks or winter grounds and migratory bird species habitats	Field inspect leks/breeding bird surveys and strategies outlined in the Wildlife Appendix	Number of males/numbers and species of migratory birds	Monitoring will be tied to yearly (varies per species, 1-5 years for migratory bird species) planning with MFWP or based upon project specific need or existing requirements	Varies and is project-specific (i.e., downward trend in lek attendance)	Extension of timing or project location or re-location, stipulations or COAs, and off-site mitigation

Element	Item	Location	Technique	Unit of Measure	Frequency and Duration	Remedial Action Trigger	Management Options
Threatened and Endangered species and other special status wildlife species habitat	Habitat use and trends	Black-tailed prairie dog colonies, interior least terns, and special status species raptor nests	Field surveys that include aerial, boat, or ground survey methodologies	Acres and number of prairie dog colonies, least tern numbers and nesting sites, and raptor nest site surveys	Monitoring will be tied to yearly planning with MFWP or based upon project-specific need or existing requirements	Varies and is project- specific	Extension of timing or project location re- location; stipulations or COAs; off-site mitigation
Upland game bird: sage and sharp-tailed grouse	Habitat condition or baseline data collection	Sage-grouse nesting, brood-rearing, winter grounds, and sharp-tailed grouse habitats	Methodologies such as line point intercept and other methodologies as outlined in the *Management Plan and Conservation Strategies for Sage Grouse in Montana-Final* (Montana Sage Grouse Work Group 2005)	Existing habitat conditions, height of residual vegetation, cover, species diversity, and potential habitat trends	Monitoring will be tied to grazing permit renewals, existing conditions, and allotments that contain a high percentage of BLM-administered lands and other actions that cause direct or indirect habitat loss	Varies and is project- specific	Mitigate potential effects of habitat conditions or loss or require changes to livestock season-of-use
Wildland Fire Management and Ecology							
Wildland Fire Management and Ecology	Fire Regime and Condition Class (FR/CC)	Area-wide	FR/CC Standard Landscape Worksheet	Composition of departure and condition classes compared to reference conditions	Field measurements evaluated on a 10-year cycle	A change in the direction of trend away from management	Implement additional vegetation or habitat treatments

Element	Item	Location	Technique	Unit of Measure	Frequency and Duration	Remedial Action Trigger	Management Options
CULTURAL RESOURCES							
Cultural Resources	Random sample of 10 additional sites	Area-wide	Site inspection	Site, surrounding area	Annually	Any noticeable trend indicating increased disturbance, natural or human-caused	For any noticeable trend indicating increased disturbance (natural or human-caused), halt activity affecting sites, increase frequency and number of sites monitored (if sites are being impacted), increase monitoring of nearby sites, and evaluate damage to sites

Element	Item	Location	Technique	Unit of Measure	Frequency and Duration	Remedial Action Trigger	Management Options
Cultural Resources (cont'd)	Site degradation caused by human activity	Significant cultural sites and area-wide	Inspection of area disturbed	Site, surrounding area	Annually	Any noticeable trend indicating increased disturbance (natural or human-caused), such as excavations	Closure of areas surrounding site to prevent further disturbance to significant cultural resources (may require an RMP amendment); for any noticeable trend indicating increased disturbance (natural or human-caused), halt activity affecting sites, increase frequency and number of sites monitored (if sites are being impacted), increase monitoring of nearby sites, and evaluate damage to sites

Element	Item	Location	Technique	Unit of Measure	Frequency and Duration	Remedial Action Trigger	Management Options
Cultural Resources (cont'd)	Environmental degradation, such as erosion or trampling	Significant cultural sites and area-wide	Inspection of displaced or altered area	Site, surrounding area	Annually	Accelerated loss or damage to significant cultural material	Closure of areas surrounding site to prevent further disturbance to significant cultural resources (may require an RMP amendment; for any noticeable trend indicating increased disturbance (natural or human- caused), halt activity affecting sites, increase frequency and number of sites monitored (if sites are being impacted), increase monitoring of nearby sites, and evaluate damage to sites

Element	Item	Location	Technique	Unit of Measure	Frequency and Duration	Remedial Action Trigger	Management Options
PALEONTOLOGICAL RESOURCES							
Paleontological Resources	Significant paleontological localities	Area-wide	Inspection of disturbed area	Degradation caused by human or natural activities that lead to loss of significant fossil resources	Annually	Loss or damage to significant fossil resources	Closure of areas surrounding site to prevent further disturbance to significant fossil resources (may require an RMP amendment)
	Random sample of 5 additional sites	Area-wide	Inspection of disturbed area	Degradation caused by human or natural activities that lead to loss of significant fossil resources	Annually	Loss or damage to significant fossil resources	Closure of areas surrounding site to prevent further disturbance to significant fossil resources (may require an RMP amendment)
	Locality degradation caused by human activity	Significant paleontological localities	Inspection of area disturbed	Percentage of locality	Annually	Any noticeable trend indicating increased disturbance such as excavations	Closure of areas surrounding site to prevent further disturbance to significant fossil resources (may require an RMP amendment)

Element	Item	Location	Technique	Unit of Measure	Frequency and Duration	Remedial Action Trigger	Management Options
Paleontological Resources (cont'd)	Environmental degradation, such as erosion or trampling	Significant paleontological localities	Inspection of displaced or altered area	Number of fossils	Annually	Accelerated loss or damage to significant fossils	Closure of areas surrounding site to prevent further disturbance to significant fossil resources (may require an RMP amendment)
VISUAL RESOURCE MANAGEMENT (VRM)							
VRM I	(see *Wilderness* in this table)						
VRM II	VRM II	See Map #	Field visit	Photo points	Once every 1 to 5 years	Unanticipated or unacceptable effects or conflicts occurring	Require mitigation; signing; increase enforcement visits; and replan for area (may require an RMP amendment)
VRM III/IV	Large scale-surface disturbing project	Planning area	Field visit or key observation points	Photos	As the need arises	Large-scale surface-disturbing project on landscape	Require mitigation
LANDS WITH WILDERNESS CHARACTERISTICS							

Element	Item	Location	Technique	Unit of Measure	Frequency and Duration	Remedial Action Trigger	Management Options
CAVE AND KARSTS							

Element	Item	Location	Technique	Unit of Measure	Frequency and Duration	Remedial Action Trigger	Management Options
FORESTRY AND WOODLAND PRODUCTS							
Forestry and Woodland Products (cont'd)	Reforestation	BiFO	Site inspection and stocking surveys	Trees per acre and visual evaluation of tree vigor	Initial survey 10 years after harvest or wildfire; subsequent survey after 15 years to determine if artificial regeneration is necessary	Less than 150 trees per acre; trees greater than 4.6 inches diameter at breast height	Planting of nursery stock or broadcast seeding
	Silvicultural treatments	BiFO	Site inspection	Trees per acre; basal area per acre; volume per acre (thousand board feet per acre); and size classes; visual evaluation of forest health	Pre- and post-treatment	Obtain current stand data information and evaluate effects of treatments	Stocking surveys, stand exams, forest inventory, permanent plots, and photo points
	Forest health	BiFO	National Agricultural Imagery Program photography, aerial detection surveys, site visits	Visual evaluation	Annually	Evaluate insect and disease damage and tree mortality levels	Silvicultural treatments, sanitation harvest, chemical application (e.g., verbenone, carbaryl)
	Roads	BiFO	Site Inspection	Visual Evaluation	Pre- and post-treatment	Damage to road surface (e.g., rutting, erosion, sediment	Culvert replacement or installation, rolling dips, proper

Element	Item	Location	Technique	Unit of Measure	Frequency and Duration	Remedial Action Trigger	Management Options
						delivery, or culvert washouts)	drainage and road placement, reconstruction, cut and fill slope stabilization, surface blading, grass seeding, armoring, road closures, timing restrictions, and other activities (see Montana BMPs in the *Forestry and Woodland Products Appendix*)
MINERALS							
Coal	Exploration license	Area-wide	Site inspection	Exploration license	The regulations at 43 Code of Federal Regulations (CFR) 3480.06(d)(4) require inspections of exploration and production as frequently as necessary,	Non-compliance with the terms and conditions of the exploration license, or operating regulations; poor reclamation; or	Require compliance with terms and conditions of the license, require appropriate reclamation, and eliminate environmental degradation

Element	Item	Location	Technique	Unit of Measure	Frequency and Duration	Remedial Action Trigger	Management Options
Coal (cont.)					but at least quarterly. Exploration license areas must be inspected for compliance with site-specific stipulations, terms and conditions of the license, and reclamation success prior to bond release. Because exploration licenses expire after 2 years license areas are typically inspected after expiration of the license but prior to bond release (or sooner if requested by the proponent).	environmental degradation	
Oil, Gas, and Geothermal	Geophysical notice of intent (NOI)	Area-wide	Line or area inspection	Operations conducted in compliance with	Minimum of once during operations	Violation of regulations, change from	Issue certified letter with corrective

Element	Item	Location	Technique	Unit of Measure	Frequency and Duration	Remedial Action Trigger	Management Options
				NOI		approved NOI	action and timeframe; bond release cannot occur until violations are corrected
Oil, Gas, and Geothermal (cont'd)	Application for permit to drill operations (surface and technical inspections)	Area-wide	Site inspection	Operations conducted in compliance with applications for permit to drill	Surface Inspections: construction, drilling, and production – Minimum of once and as necessary Interim and final reclamation – minimum of once and until reclamation is complete Technical inspection: drilling and production –	Violations of regulations, change from approved applications for permit to drill	Issue a written order or an incident of non-compliance with timeframe to correct violations or shut in operations

Element	Item	Location	Technique	Unit of Measure	Frequency and Duration	Remedial Action Trigger	Management Options
					minimum of once and as necessary		
Oil, Gas, and Geothermal (cont'd)	Sundry notice	Area-wide	Site inspection	Operations conducted in compliance with approved sundry notice	As necessary	Violations of regulations, change from approved sundry notice	Issue a written order or an incident of non-compliance with timeframe to correct or shut in operations
	Oil and gas drainage	Area-wide	Drainage evaluation	Radius of drainage	As necessary	The BLM determines that federal oil or gas is being drained (physically removed) by an off-lease well.	Notify lessee of drainage situation. Require lease protection, compensatory royalty, or relinquishment
	Produced water disposal	Area-wide	Site inspection	Operations conducted in compliance with permit	Minimum of once annually or as necessary	Violation of regulations or change from approved permit	Issue a written order or an incident of non-compliance with timeframe to correct or shut in operations
	Spill	Area-wide	Site inspection	Spill area cleaned up and reclaimed	Minimum of once after event and as necessary	Violation of regulations or change from approved permit	Issue a written order or an incident of non-compliance

Element	Item	Location	Technique	Unit of Measure	Frequency and Duration	Remedial Action Trigger	Management Options
							with timeframe for correction
Locatable Minerals	NOIs	Area-wide	Site inspection	NOI	At least four times each year, the responsible field office would inspect an operation if the operator uses cyanide or other leachates or where there is significant potential for acidic or deleterious drainage(43 CFR 3809.600(b). active notices and plans that do not involve leachates should be inspected at least two times per year. These inspection frequencies are minimums; field offices are encouraged to conduct inspections on a more frequent basis where it	Non-compliance with the terms and conditions of the NOI or Plan of Operations, surface management regulations, poor reclamation, or environmental degradation	Require compliance with the terms and conditions of the NOI or Plan of Operations, surface management regulations, and require that reclamation was appropriately completed and environmental degradation did not occur.

Element	Item	Location	Technique	Unit of Measure	Frequency and Duration	Remedial Action Trigger	Management Options
					is deemed necessary. MBiFO currently has no plans or notices that use leachates.		
Mineral Materials	Permits and contracts	Area-wide	Site visit	Permits and contracts	Inspections are required at least once per year for sales less than 5,000 cubic yards and twice per year for sales larger than 5,000 cubic yards.	Non-compliance with the terms and conditions of the permit or contract, regulations, poor reclamation, or environmental degradation	Require compliance with the terms and conditions of the permit or contract, regulations, and require that reclamation was appropriately completed and environmental degradation did not occur.

Element	Item	Location	Technique	Unit of Measure	Frequency and Duration	Remedial Action Trigger	Management Options
RECREATION							
Recreation	General recreation use	Area-wide with emphasis on dispersed use of undeveloped recreational sites (extensive recreation management areas)	Area inspection to look for vandalism and resource abuse and to install photo points	Site condition	Twice a year (e.g., once in June and once in October) and photograph annually	User conflicts, resource degradation, or safety hazards	Signing, fencing or other mitigation measures
	Concentrated recreation use and demand	Special recreation management areas and sites with recreation facilities	Visitor registration, traffic counters, estimates, and photo points	Visitor days and site condition	Visitor registration boxes and counters checked once monthly (at the minimum) and weekly or biweekly during heavy use periods; photograph annually	Increased visitor use per year or sustained use that requires additional or improved facilities	Monitor more frequently and signing, fencing, or other mitigation measures
		Area-wide commercial and competitive activities (special recreation permits)	Administrative review and site inspection or reviews for permittees with permit stipulations	Permit stipulations, resource condition, and success of reclamation	On site during competitive events, periodic site inspection for commercial operations,	Violation of permit stipulations, irreparable resource damage, and compromised visitor safety	Monitor more frequently and signing, fencing, or other mitigation measures

Element	Item	Location	Technique	Unit of Measure	Frequency and Duration	Remedial Action Trigger	Management Options
					and administrative review annually	and recreation experience	
RENEWABLE ENERGY							
Renewable Energy	Rights-of-way (ROWs)	Area-wide	Site inspection	ROW	Minimum of once during or for construction within 5 years of issuance, then in the 20th year after issuance and every 10 years thereafter; before release or collection of a bond; before renewal termination or relinquishment acceptance; or as required by specific terms and conditions in the ROW grant or the plan of development (POD) or regulations	Nonuse of the ROW or violation of ROW grant stipulations, the terms of the POD, or regulations	Require compliance with ROW grant stipulations, POD terms, or regulations with possible suspension or termination for non-compliance or nonuse

Element	Item	Location	Technique	Unit of Measure	Frequency and Duration	Remedial Action Trigger	Management Options
TRAVEL MANAGEMENT AND OHV							
Travel Management and OHV (cont'd)	Track progress on implementation or planning signing, and mapping	Planning-area-wide	Field trips and localized public meetings	Verify minimized resource damage, user conflicts, and new user-created roads	Annual	Effects not anticipated in EIS or unacceptable effects	Require further mitigation or reclamation; consider replanning area (may require an RMP amendment)
REALTY, CADASTRAL SURVEY, AND LANDS							
Realty, Cadastral Survey, and Lands	ROWs	Area-wide	Site inspection	ROW	Minimum of once during or for construction within 2 years of issuance for Mineral Leasing Act reviews and within 5 years of issuance for Federal Land and Policy Management Act reviews, then in the 20th year after issuance and every 10 years thereafter; before release or collection of a bond; before renewal termination or	Nonuse of the ROW or violation of ROW grant stipulations, the terms of the POD, or regulations	Require compliance with ROW grant stipulations, POD terms, or regulations with possible suspension or termination for non-compliance or nonuse

Element	Item	Location	Technique	Unit of Measure	Frequency and Duration	Remedial Action Trigger	Management Options
					relinquishment acceptance; or as required by specific terms and conditions in the ROW grant or the POD or regulations		
Realty, Cadastral Survey, and Lands (cont'd)	2920 Land Use Permits and Leases	Area-wide	Site inspection	Lease or Permit	Minimum of once during or for construction within 2 years of issuance; before release or collection of a bond; before renewal termination or relinquishment acceptance; or as required by specific terms and conditions in the lease or permit or the POD or regulations	Nonuse of the lease or permit or violation of lease or permit stipulations, the terms of the POD, or regulations	Require compliance with lease or permit stipulations, POD terms, or regulations with possible suspension or termination for non-compliance or nonuse
	Other Land Use Authorizations	Area-wide	Site inspection	Use Authorization	Minimum of once during or for construction; before release or collection of a bond;	Nonuse of the authorization or violation of authorization stipulations, the terms of the POD, or	Require compliance with authorization stipulations, POD terms, or regulations;

Element	Item	Location	Technique	Unit of Measure	Frequency and Duration	Remedial Action Trigger	Management Options
					before renewal termination or relinquishment acceptance; or as required by specific terms and conditions in the authorization or the POD or regulations	regulations	with possible suspension or termination for non-compliance or nonuse
Realty, Cadastral Survey, and Lands (cont'd)	Commercial film permits						

Element	Item	Location	Technique	Unit of Measure	Frequency and Duration	Remedial Action Trigger	Management Options
SPECIAL DESIGNATION AREAS							
ACECs	Cultural ACECs	Area-wide	Site inspection	Sites receiving most public visitation, surrounding area	Annually	Any noticeable trend indicating increased disturbance, natural or human-caused	Increase frequency of monitoring to ensure ACEC values are not being impaired
	Paleontological ACECs	Bridger Fossil Area	Site inspection	Site, surrounding area	Annually	Any noticeable trend indicating increased disturbance, natural or human-caused	Increase frequency of monitoring to ensure ACEC values are not being impaired

Element	Item	Location	Technique	Unit of Measure	Frequency and Duration	Remedial Action Trigger	Management Options
ACECs (cont'd)	Geologic and Scenic ACECs	Area-wide	Site inspection	Site, surrounding area	Annually	Any noticeable trend indicating increased disturbance, natural or human-caused	Increase frequency of monitoring to ensure ACEC values are not being impaired
	Research Natural Areas & SS plants	Area-wide	Site inspection	Site, surrounding area	Annually	Any noticeable trend indicating increased disturbance, natural or human-caused	Increase frequency of monitoring to ensure ACEC values are not being impaired

Element	Item	Location	Technique	Unit of Measure	Frequency and Duration	Remedial Action Trigger	Management Options
National Historic Trails	Lewis & Clark NHT and Nez Perce NHT	Area wide	Area inspection to look for vandalism, resource abuse, and to install photo points	Site condition	Annually	User conflicts, resource degradation, or safety hazards	Signing; site mitigation; more restrictive management (may require a resource management plan [RMP]
Pryor Mountain Wild Horse Range	PMWHR	PMWHR / Territory	• Wild horse inventory • Flight, vehicle, and foot review • Range monitoring	• Number of animals • Rangeland Health	Annually	Wild horse population and use patterns	• Fertility control • Removal • Water and habitat projects for distribution
Wilderness Study Areas	WSAs	WSAs	Flight, vehicle, and foot review	Surface disturbance	Once per month if the area is accessible unless an alternate schedule is approved by the State Director	Unauthorized actions	Require reclamation or possible civil or criminal action and public notification

Element	Item	Location	Technique	Unit of Measure	Frequency and Duration	Remedial Action Trigger	Management Options
Wild and Scenic Rivers	WSR	Area-wide	Vehicle and foot review	Site, surrounding area	Annually		
SPECIAL DESIGNATION AREAS							

Element	Item	Location	Technique	Unit of Measure	Frequency and Duration	Remedial Action Trigger	Management Options